

ECE 1778: Creative Applications for Mobile Devices



Lecture 3
January 27, 2021



(1)



Why We're Here

- To bring together people from different disciplines to build an interesting & creative mobile/wearable application

- To learn how to do this & actually do it!



Today

1. Logistics/Organization of Course & Project
2. Assignments P2 & S2
3. Idea Brainstorming and Creativity Inspiring:
 - Case Studies of Apps
4. Project Group Forming



Logistics

(4)



Assignments: Bringing you Up To Speed

- S1 and P1 were due last night
- S2 is due next Tuesday (Feb 2nd) at 6pm
- P2 is due Tuesday February 9th at 6pm
 - Are posted on the main course [website](#) and Quercus
- There will be one more programming assignment
- There will be two more Specialist assignments



Project Stages

1. Forming Groups

- Form group by tomorrow Jan 28; SEND EMAIL as DESCRIBED

2. Project Topic Approval-in-Principle

- Done via email –send short description to me; will respond fast
- Due February 3rd prior to class; must have approval to proceed

3. Project Proposal/Plan

- Document Due February 15th [Changed/had it wrong]

4. Proposal & Plan Presentations

- February 17th
- **NOTE EXTRA LECTURE Wed February 17th, 6-8pm**

5. Spiral 2 & Spiral 4 Presentations

- 2: March 10/17 4: March 24/31

6. Final Presentations

- Weeks of April 7/14

7. Final Report Due April 21st



Meet Tonight to Form Groups/Discuss ideas

- Wed January 27th, 6:30pm-8:00pm
 - On same class Zoom Link
- We will help make matches, similar to today
 - Will use breakout rooms as necessary

- Can also be there to kick around ideas to help with direction/scope
 - Will make use of having everyone there



Group Forming Status

Programmers	Specialists
42	19

- Counts comes from assignments [P1 and S1] also including 3 external specialists
- 61 total students/specialist
 - 10 more still registered in course, but didn't hand in P1 or S1
- Groups: 1 Specialist + 2 Programmers
- 14 groups formed as of this morning
 - Must send me email to 'form'
- Will provide time today to help form groups



More Hot-off-the-press Data

- There are 6 available specialists
 - Need to find a programming pair
- There are 14 Programmers available
 - Need to pair
 - Then find a specialist

- We will work on this today, in this class, and tonight
 - Need to give priority to people in far time zones during this class



Send Me Group Info When Formed

■ Send email to me:

- Jonathan.Rose@ece.utoronto.ca
- Copy email to all group members
- this a formal commitment

■ The email **must** contain (**please do this**):

- Names of all students and student numbers
- UofT email address of all members (or otherwise if external)
- Department & Field of each group member
- Degree being pursued by each group member (M.A., Ph.D., M.A.Sc., M.H.Sc., M.Eng, M.S.A.C. etc.)
- **Indicate who is a Programmer, who is Specialist/External Specialist**
- Mobile platform: Android or iOS?



Next Project Step:
Approval-in-Principle



Approval-in-Principle: February 3rd

- Once your group is formed, you must fairly quickly come to a rough idea of what you're going to do for project
- This week you should be kicking around ideas between yourselves, myself and TAs
 - We will go back and forth as necessary
- Your group must have my approval of the general idea of your Project by end of day Wednesday February 3rd
 - Start now! Will be able to use part of this class to have informal discussion of topic with team and myself & TAs



What to Send for Approval

- 1. What & Why:** A few sentences describe what the project is and how it is motivated.
- 2. Expertise Link:** Make clear how this app fits within the expertise of the Specialist and **what the contribution** the project makes to the Specialist's field or research
- 3. Name:** Give your App a Name
 - name should convey the essence



How to Describe Your Topic?

- Key is to say **what & why**

- engineers tend to think about **how** too soon, be warned
- You will need to think about how to make the **what feasible**, but not in first description for someone else to understand

- Should be the completion of this sentence:

“The goal of our app is to ...”



Good Example Description

- **What:** The goal of our App is to help train surgeons to gain fine motor skills by measuring their movements and providing feedback on the movement quality.
- **Why:** Surgical training is difficult, and lacks quantitative feedback.
- **Specialist Expertise:** Training to be Surgeon, currently taking 1 year off to do M.Ed.
- **Name:** STAN “Surgical Trainer and Navigator”

- **How:** accelerometer attached to hands to measure fine motion quantitatively



That was a Little Misleading

- This is the description as it stood **at the end** of the project
- **It didn't start out this way**, it needed refinement
- This refinement process is an essential part of learning



Poor Example Description

It's a customizable cloud-based student/teacher homework and dynamic scheduling app that learns how and when students do their homework, rewards task completion, pushes reminders and adjusts scheduling according to need. It also allows teachers to create ubiquitous learning exercises and to push AR enhanced homework to students. We also hope to build in a GPS-based study group and knowledge building capability. It sounds like a lot but my coders believe they can pull it off. We have prioritized elements and are confident that the core elements can be coded. *I will send you the required Specialist summary later this week.*



What is Wrong with it?

1. Hard to say **what** it is – it is many things, and lacks focus.
2. Doesn't say **why** (e.g. What problem is being solved, why a specific capability is needed/worthy).
3. No name! (This group had real trouble with names)
4. No connection to what the Specialist's expertise is.
 - Last part in italics was the specialist saying he would get around to this **next week!**



How To Send in Approval-in-Principle

- Send an email to me – Jonathan.Rose@ece.utoronto.ca
 - Just one per group
- Send as soon as ready
- Need to get statement back from me: “Your Project has Approval-in-Principial”
 - There may be some back and forth between us
 - Over these years, there has been a fair amount of revision



Step After Approval-in-Principle: Proposal/Plan



Proposal/Plan Due Monday Feb 15 @ 6pm

1. Reprise Goal, make more precise
 - What & Why
2. Rough design of what the **user** of the App sees
 - Screen designs
 - Use Marvel App - <https://marvelapp.com>
 - From Specialist Assignment 2
 - Any drawing package will do
3. **Block Diagram** overview of planned code
 - Top down description of the major pieces & communication
 - With short description of each
 - Should be linked to the screens
 - I will discuss creation of block diagrams next week



Plan, continued

4. Statement of Risks/Issues

- What roadblocks/issues/challenges do you foresee?
- Software, Hardware, Data

5. What do you need to learn that you don't know

- all members

6. **Important:** Specialists

- Submit a 500 word essay on
 1. How App relates to field of Specialist, and
 2. How the Specialist will contribute to project
 - Need to be an active participant throughout
 - How will you do that?
 - **Issue Tracking** on Github



Proposal/Plan Document

- length: 1500 words max
 - not including Specialist essay (#6)
 - include word count, penalty for overage
- Seeking clarity, not quantity of words
 - Omit needless words
- **One member of group should submit for group**
 - Under “Proposal Plan” for your group, under its name
- Worth 10% of grade
 - including in-class presentation done following week
- Document Due Monday February 15th at 6pm



That Same Week: Prop/Plan Presentation

■ Proposal/Plan **Presentation**

- Concise, clear presentation by all groups of proposal/plan
- 5 minute presentations
- followed by discussion/questions

■ Will take place in **Two Lectures on February 17**

- Regular lecture in morning
- Extra one in evening, from **6-8pm**
- put in your calendar now!
- Required to come to both:
 - you will either be presenting or peer-reviewing in both



Assignment P2 – for Programmers

Advanced UI, Authentication, Database, File Storage

Available on Quercus and Public Course Website



Assignment P2

■ Goals

- learn more complex UI
- use additional capabilities of Google Firebase as backend

■ Augmentation of Instagram-type app

- Store user info in online Firebase **database**
- Store pictures in online **storage**
- Display basic ‘feed’ of this user’s pictures
- + more (see specification)

■ Due in 2 weeks, Tuesday February 9th at 6pm



Note & Demo

- 8/10 of grade is for functionality
- 2/10 of grade is for quality of User Interface/Experience
- **Here is a demo of *one way* this assignment can look**
 - There are other ways that are fine too

[P2 Demo Link](#)



Assignment S2 – for Specialists

Practicing Creativity, App Design Principles, Marvel App,
Critical Feedback and Thinking

Posted on both Quercus and Public Course Website



Design of Apps from UI Perspective

UI = User Interface

- How the app looks to a human
1. Learn **Marvel** tool basics by going to website and reading help (look also for youtube instructional videos)
 2. Learn user/app visual design concepts:
 - [Android](#): (on *material* design)
 - Apple: [Here](#) and [Here](#)
 3. Create an App (next slide)
 4. Interview Potential Users & Get Feedback
 5. Engage Your Own Critical Thinking



Create App that Uses *Emotion Recognition*

- Given the following capability: software that can look at a *video*, identify the faces of the people in the video, and determine the *emotion* they display, one of
 - neutral
 - happy
 - sad
 - angry
 - fear
 - anticipation
 - surprise
- Given this, invent interesting app that makes uses it
 - Can't be the simply reporting of emotion



App Using Emotion Recognition

1. Design the app, and mock it up using **Marvel App**
 2. Describe App (500 words, what & why)
 3. Also give 400 words on the design
 - Describe the design principles you're using in the decisions you make to the design the app (from Part 2)
 4. Present it to 3 people, and get their feedback on it
 5. Do a critical analysis of it
-
- **Due next week, Tuesday Feb 2nd at 6pm.**
 - 1500 words maximum; -0.1 marks (of 10) for every word over



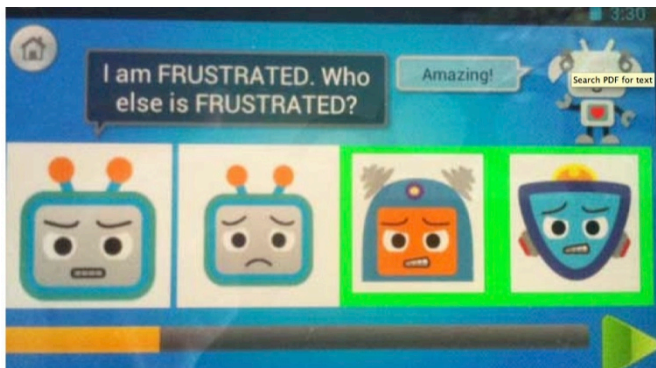
Previous Projects and Applications

To Provide some context for your project and
to Help with Creative Process



EYEidentify

Teaching Emotion Recognition to Autistic Children



Rebecca Dreezer
Cindy Lau
Alexandra Makos

April 2012

Goal

- Help autistic children learn to recognize 4 emotions:
 1. happiness
 2. sadness
 3. confusion
 4. frustration

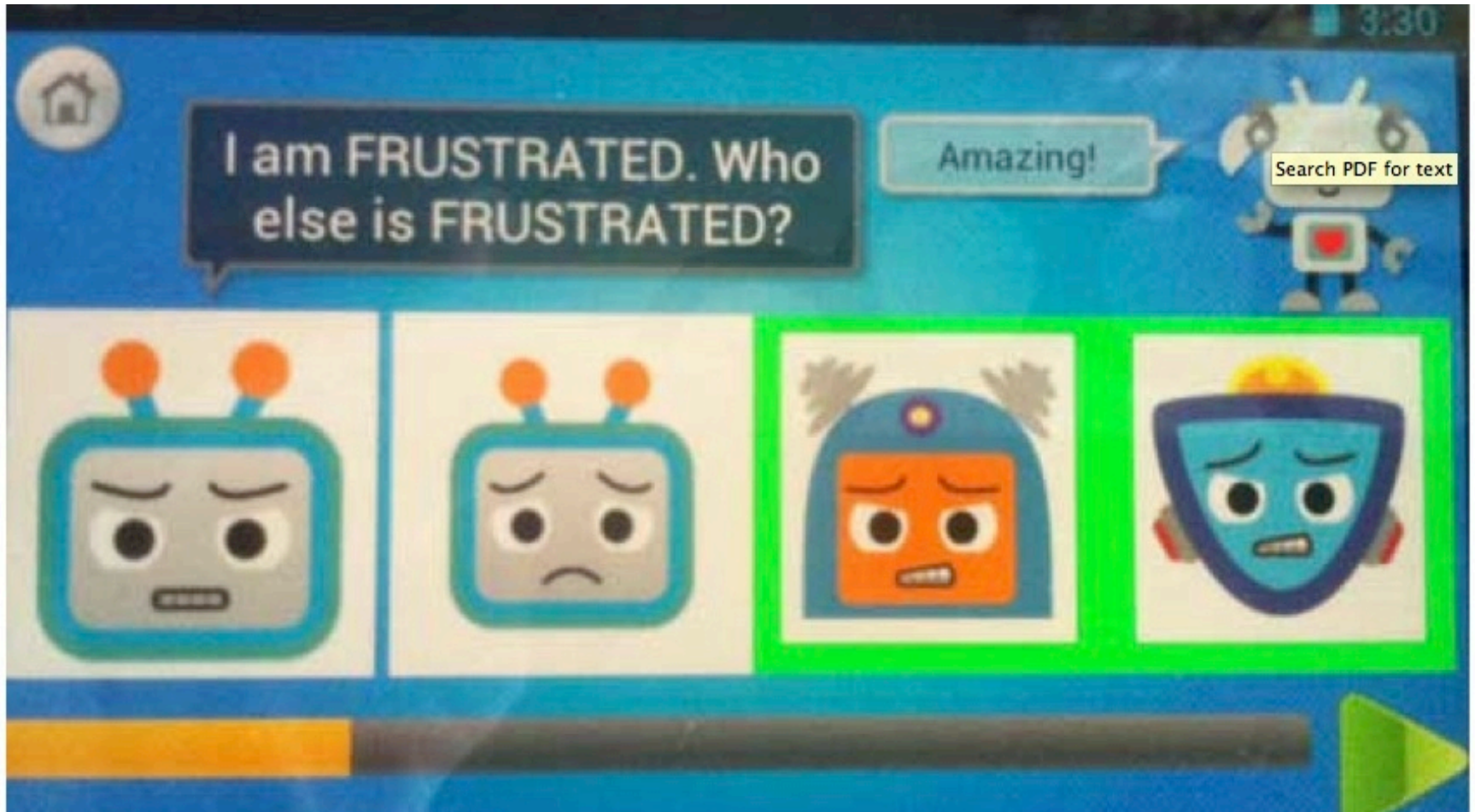
- A simple matching game
 - With an engaging user experience

Based on Research

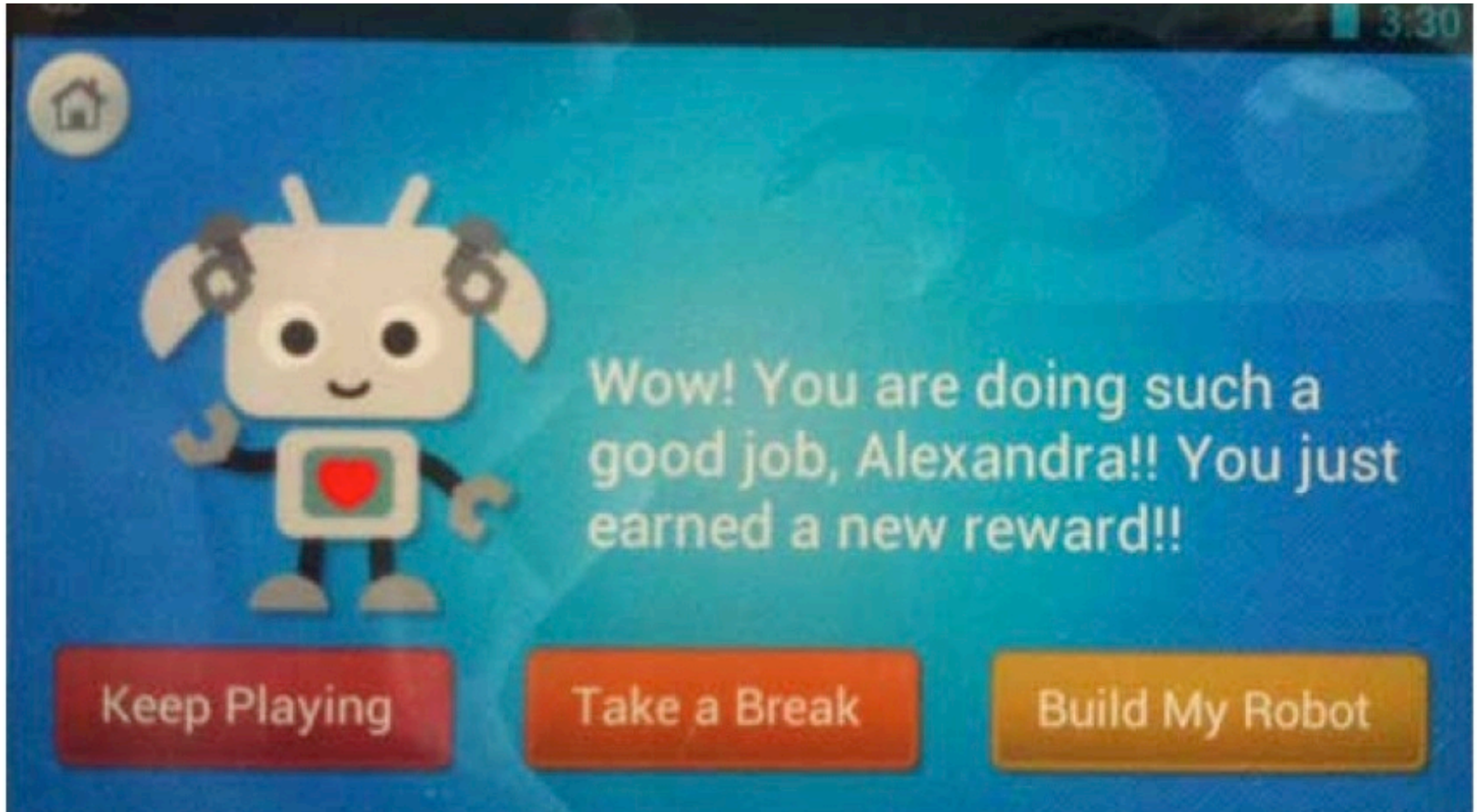
- Have 3 classes of “faces” that can be identified by players



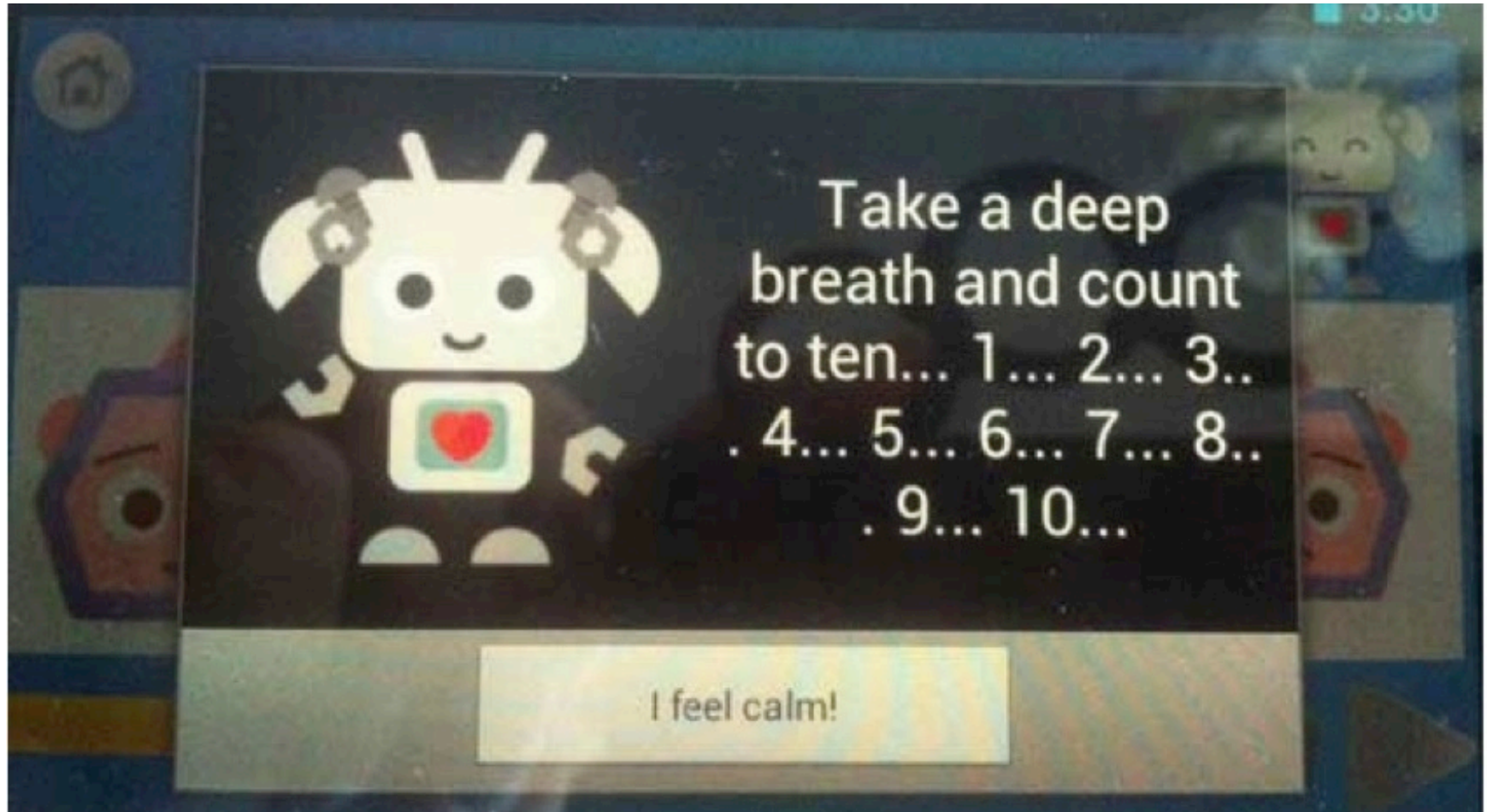
Games Screen



Choices



Accelerometer Detected Frustration



EncountAR

Interacting with Museum Exhibits



Scott Pollock
Sheng Xu
Tony Zhou

April 2012

(39)



Museums & Art Gallerys

- Struggling to stay relevant
- Many being put online
- Scott's idea (from others): be able to interact with an exhibit
 - Leave 'postings' on the exhibit itself, in virtual world



AR = Augmented Reality

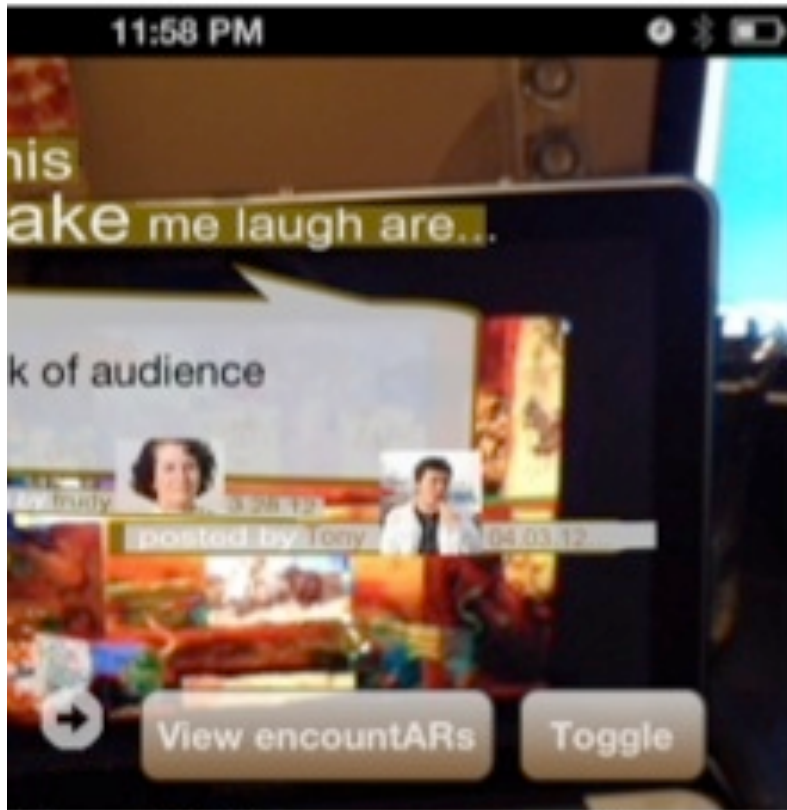
- View the world through the camera/screen
- Add in extra things on top
- Add picture from somewhere else?



For Example



User Annotation of Exhibits



(LEFT) AUGMENTED REALITY VIEW, (RIGHT) ENCOUNTERAR R

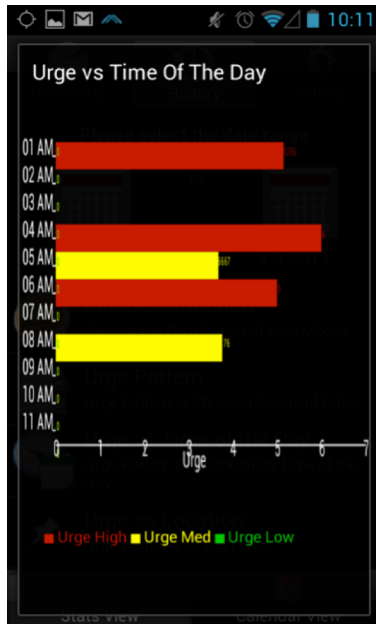
Discussions



(LEFT) ENCOUNTERS VIEW, (RIGHT) ENCOUNTER THREAD VIEW

Mindful Me

Journaling for Addiction and Intervention



Elizabeth Glenn Guy

Shobhit Puri

Yvonne Chen

April 2013

(45)

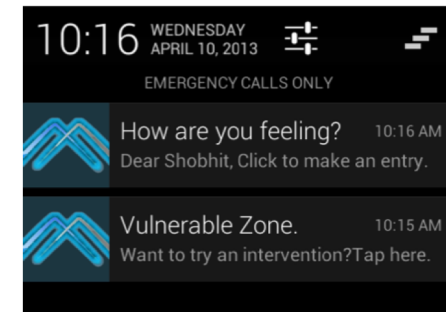


Addictions ruin Lives



One Method in Addiction Treatment

- Is to write down cravings in a diary
 - Identify vulnerable *contexts* → determine ways to resist/avoid
- **Problems** writing on paper/book:
 - Invasions of privacy
 - Tedious
- **Solution:** use mobile device to aid journaling
- Increase journaling frequency → efficacy:
 - Easy to use interface
 - Automatic location identification/data processing
 - Data visualization & vulnerable location identification



The Big Idea

- With a phone, you can not only record the issues/cravings, but it can record:
 - Where you are
 - How you were moving
 - What you were hearing
 - Perhaps what you were seeing
- It could learn that a certain location is a problem for you (e.g. near a Bar that an Alcoholic frequents)
- It (the phone itself) could then **Intervene!**
 - **If it thought you were heading towards a relapse**

Interventions?

- Call your Alcoholics Anonymous Sponsor **for you**
- Play a song
- Send you a text
- Play a game
- Help with breathing exercises

- Many other possible ideas!



Journal Screens

The image displays two screenshots of a mobile application interface. The top screenshot shows the 'New Entry' screen with a navigation bar containing 'New Entry', 'History', and 'Setting' buttons. The main content area displays 'Hello Shobhit, Please rate your mood level.' Below this is a horizontal scale from -3 to 3 with a slider set at 0. The bottom screenshot shows the 'Rate your urge level.' screen with a navigation bar and a horizontal scale from 1 to 7. Below the scale, it says 'My urges to engage in addictive behaviors are at a level 5'. A callout box titled 'My ability to resist my craving' contains a legend for the urge level scale.

Saving screenshot...

New Entry History Setting

Hello Shobhit, Please rate your mood level.

-3 -2 -1 0 1 2 3

Your current mood level: 0

New Entry History Setting

Rate your urge level.

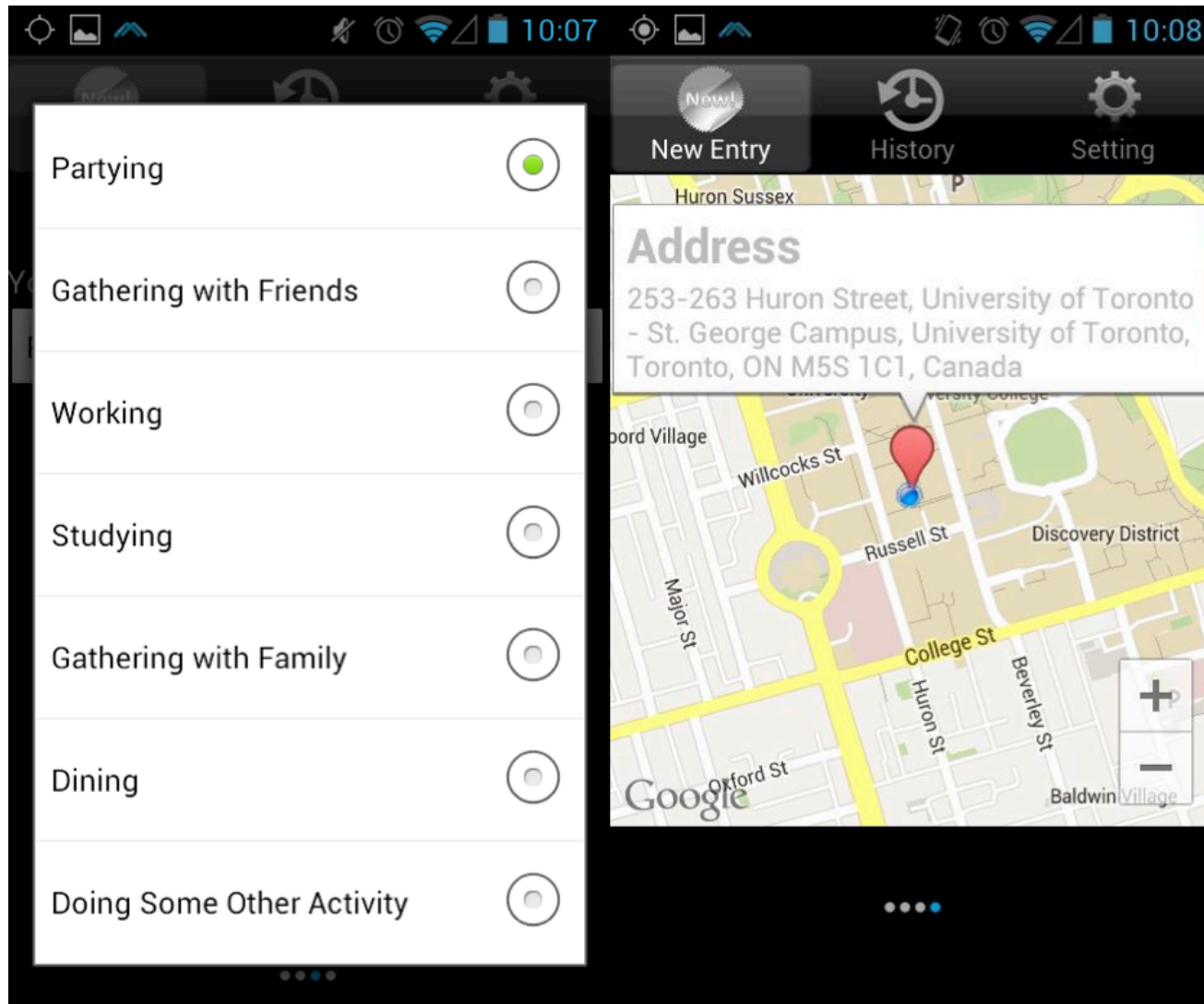
1 2 3 4 5 6 7

My urges to engage in addictive behaviors are at a level 5

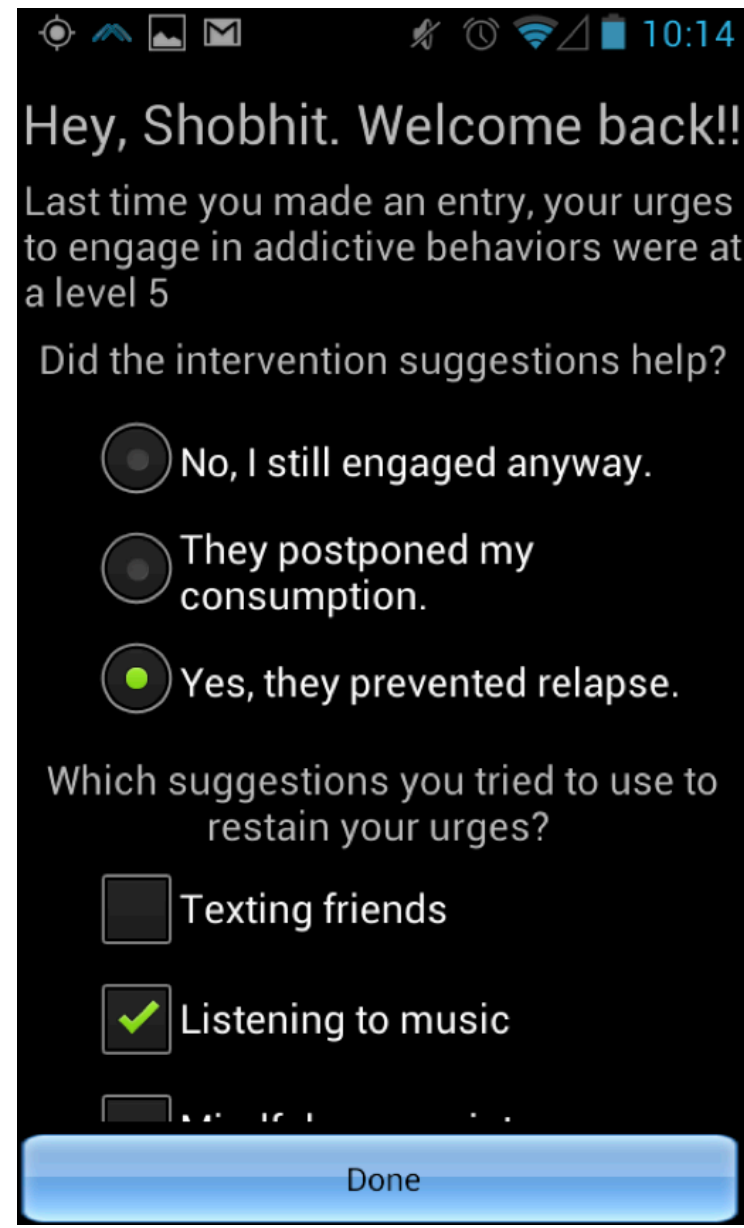
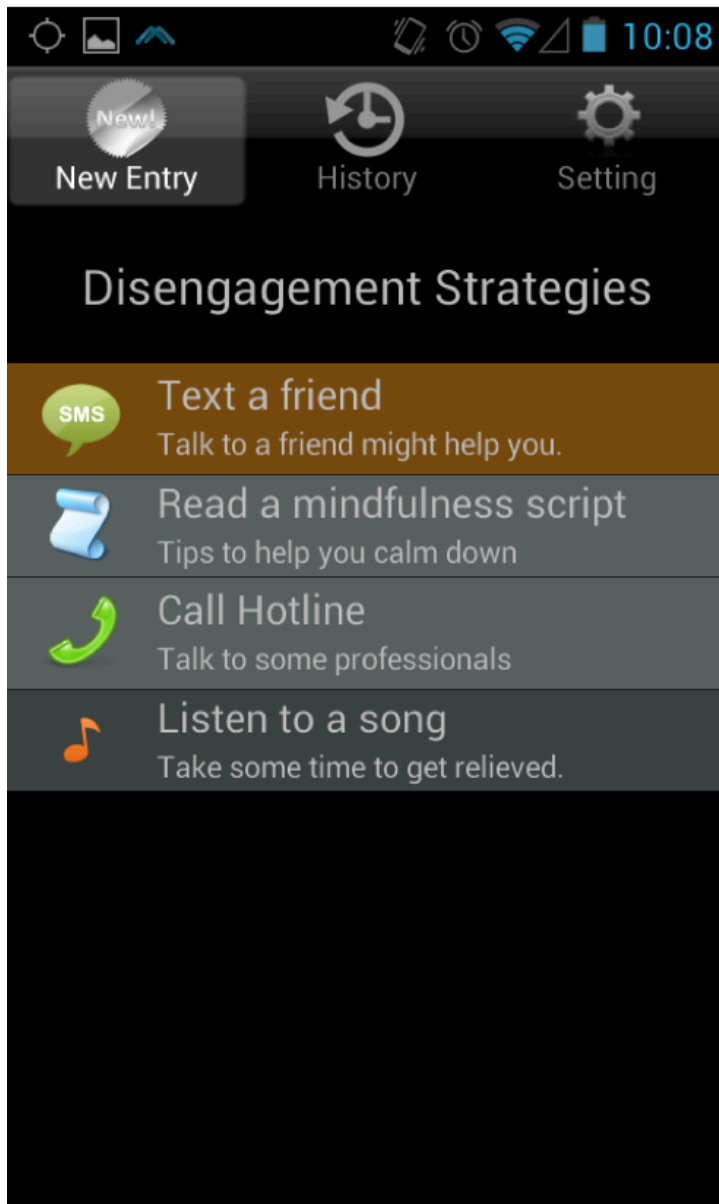
My ability to resist my craving

1	Not at all difficult
2	Very mildly difficult
3	Mildly difficult
4	Moderately difficult
5	Very difficult
6	Extremely difficult
7	Not able to resist

Locating & Specifying Activity



Intervention Suggestions



Data Collection

New Entry History Setting

Please select the date range

4-2-2013 to 4-9-2013

- Mood Distribution
Percentage Distribution of your Moods
- Urge Pattern
Urge Pattern in Chosen Range of Dates
- Urge vs Time of the Day
Urge Pattern Distribution by Time of the Day
- Urge vs Location
Urge Pattern Location Wise

Stats View Calendar View

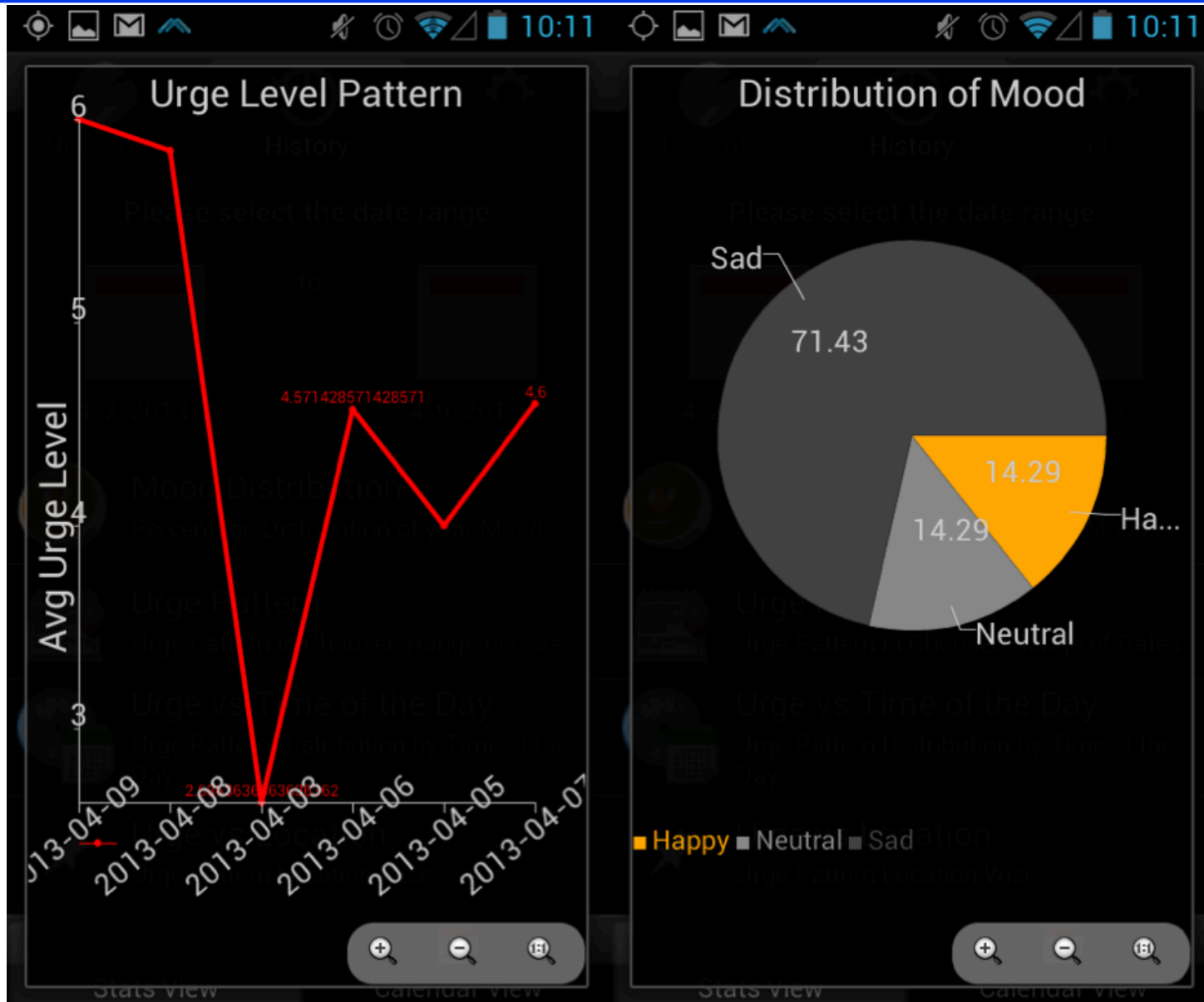
New Entry History Setting

2013 April

SUN	MON	TUE	WED	THU	FRI	SAT
31	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	1	2	3	4
5	6	7	8	9	10	11

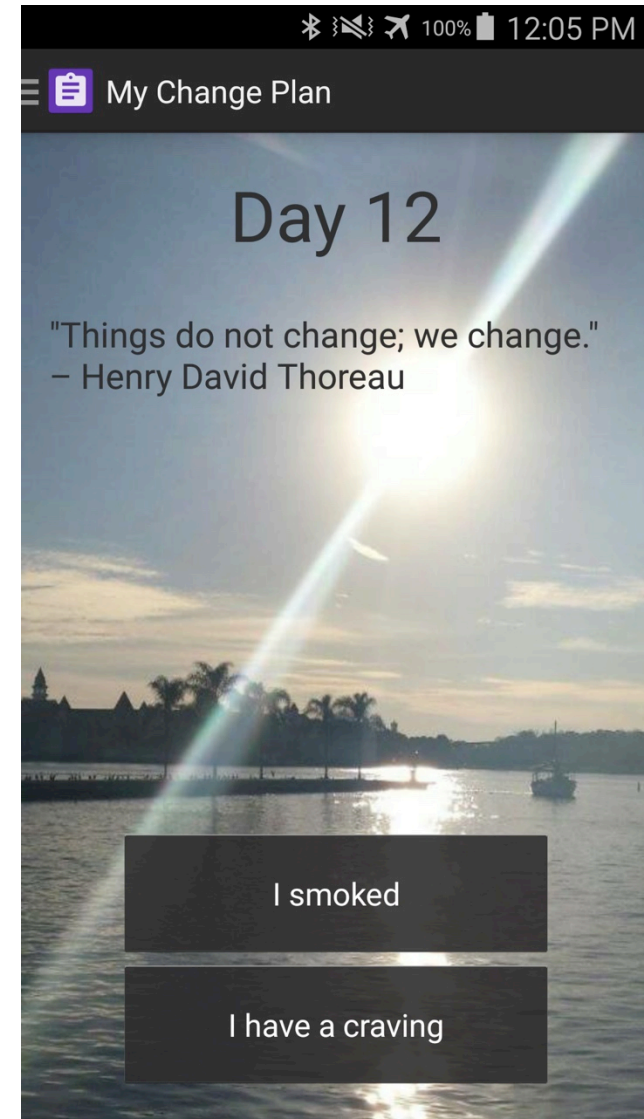
Stats View Calendar View

Data Display



Follow-up Research: Smoking Cessation

- 'Mindful Me' was a general addiction app done in the course
- These past 6 years, we launched a specific project in helping people to stop smoking
 - In collaboration with Nicotine Dependence Clinic, part of CAMH
- Has been released on both App stores
 - Still available on iOS
 - CAMH is now taking over.



**Now:
Group Forming Time and/or
Topic Discussion**



First: Unaffiliated Specialists

- Any specialist who has not yet spoken
 - And does not have a group



Four Kinds of People Now

1. Un-paired Programmers - **Breakout room 1**
 - Form groups of 2 programmers
2. Paired Programmers – **Breakout room 2**
 - Need Specialist
3. Un-grouped Specialists – also **Breakout room 2**
 - Need pair of programmers
4. Already in full Groups -
 - Take this time to discuss your topics
 - Can grab time with me & TAs in other breakout rooms
 - Kia and Imithan will also be co-hosts
5. Will bring class back if settles down; will continue tonight otherwise



Meet Tonight to Form Groups/Discuss ideas

- Wed January 27th, 6:30pm-8:00pm
 - On same class Zoom Link
- We will help make matches, similar to today
 - Will use breakout rooms as necessary

- Can also be there to kick around ideas to help with direction/scope
 - Will make use of having everyone there



Apt To Learn

Using Phones in the Theatre



Arlynda Boyer

Abderahmane Allalou

Zohaib Alam

April 2016



The Problem

- Theatre patrons are not very compliant with turning off their phones when asked before the show
- Plays are interrupted by chimes, buzzes, and beeps, which are disturbing to actors and other audience members and which diminish the experience of the play for everyone
- Theatre audiences tend to be older and theatres need ways to embrace, rather than ban, technology and ways to reach out to new, younger playgoers

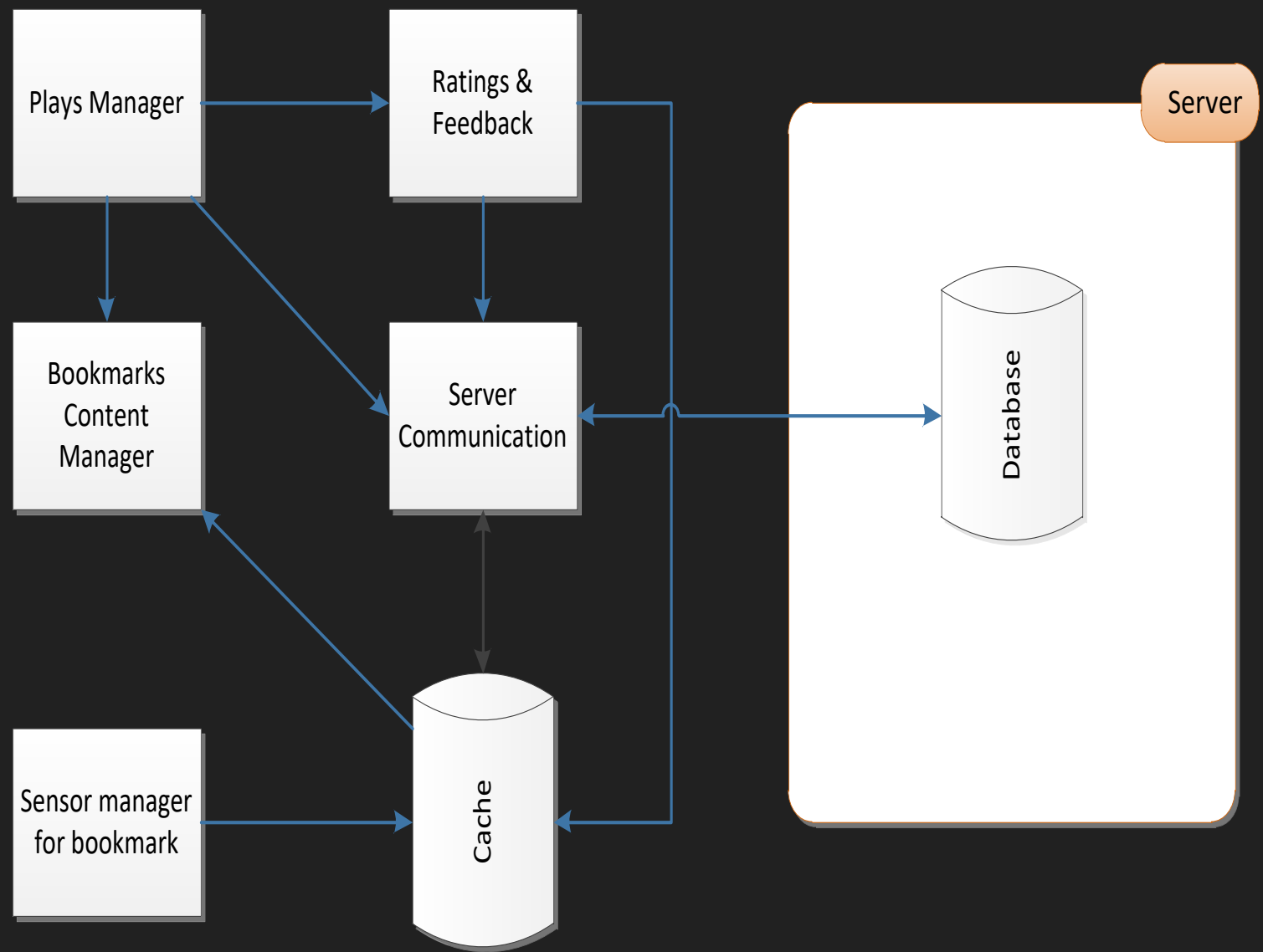


Our Solution

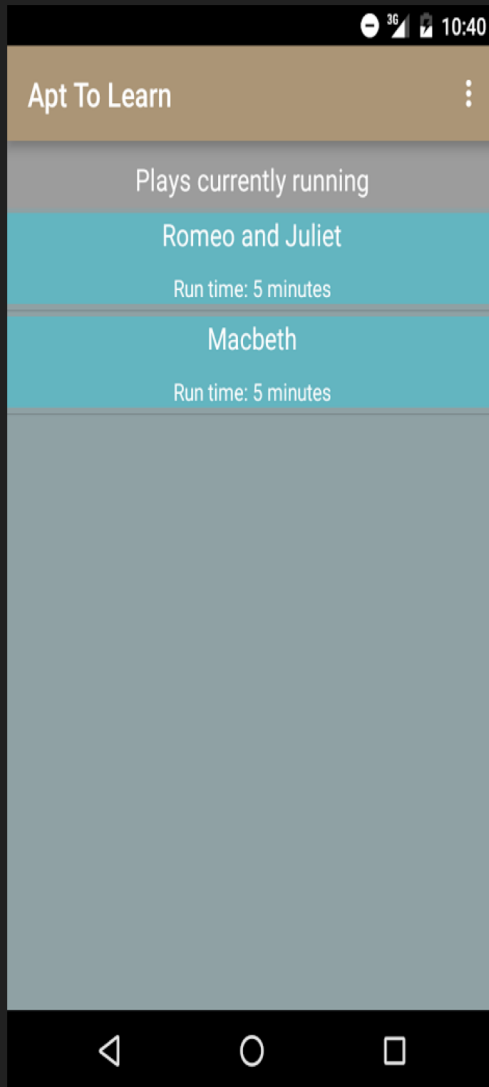
- Introduce mobile technology to the theater experience
- Theater goers can bookmark moments of live action, review them after the play, and learn more about the production they just saw and also about the play and about Shakespeare
- Feedback from playgoers is sent to server for researchers to analyze



Block Diagram



How it works



Live Demo:

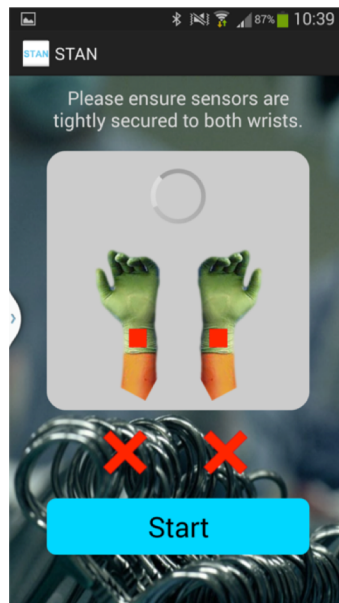
- Users join the play on their phones, which is a recorded production synced by the house manager to that night's show; users can join at any point
- Users' phones are given a blank screen and set to silent
- Users bookmark moments in the play using double-tap
- After the show, users can view bookmarks on timeline, which are clickable
- Bookmarks provide detailed explanation of the scene



Why It Works

- Silent phones and dark screens are exactly the behavior theatres need from phones, while still embracing technology's ability to enrich their show
- Users do not have to turn off their phones
- Playgoers can learn more about the play and clear up moments of confusion
- Theatres can use feedback to better understand how audiences are perceiving the show and what they like or dislike about it

Surgical Trainer and Navigator (STAN)



Dorotea Mutabdzic

Rorik Henderson

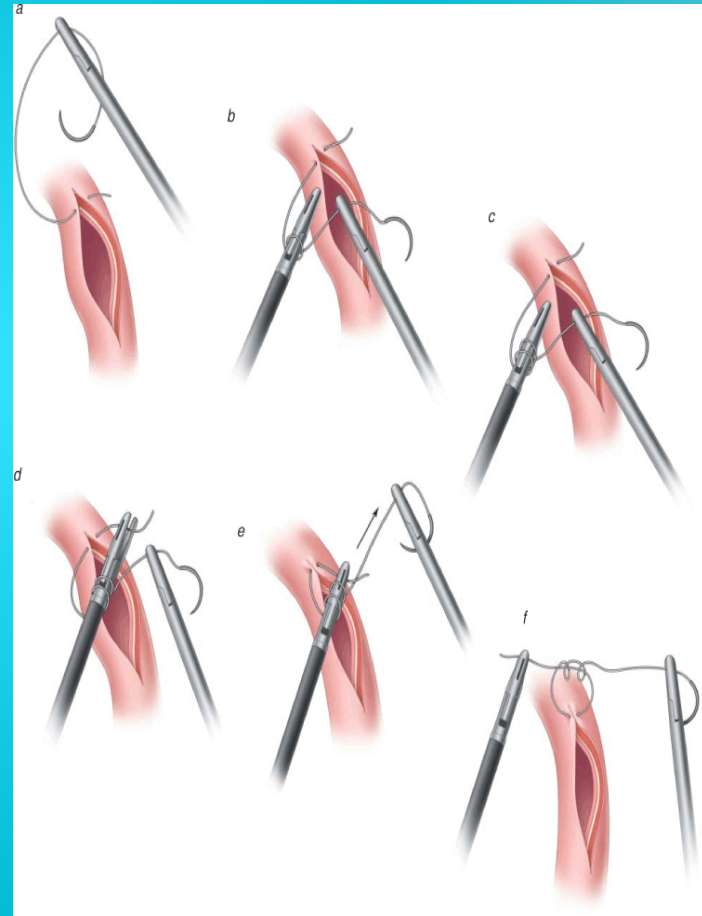
Kyle Tsang

April 2014

Learning to operate is like...



Until...



Currently technical performance is...

1 2 3 4 5
Below expectations Meets expectations Exceeds expectations

But:

Association for Surgical Education

Intraoperative assessment of technical skills on live patients using economy of hand motion: establishing learning curves of surgical competence

Ethan D. Grober, M.D. Med.*, Matthew Mohammed Mahdi, Vanessa Bacal

The American Journal of Surgery 184 (2002) 70-73
Scientific paper

The relationship between motion analysis and surgical technical assessments

Vivek Datta, B.Sc. M.B.B.S.* , Avr
Surg Endosc (2013) 27:1468-1477
DOI 10.1007/s00464-012-2631-7
Ar

REVIEWS

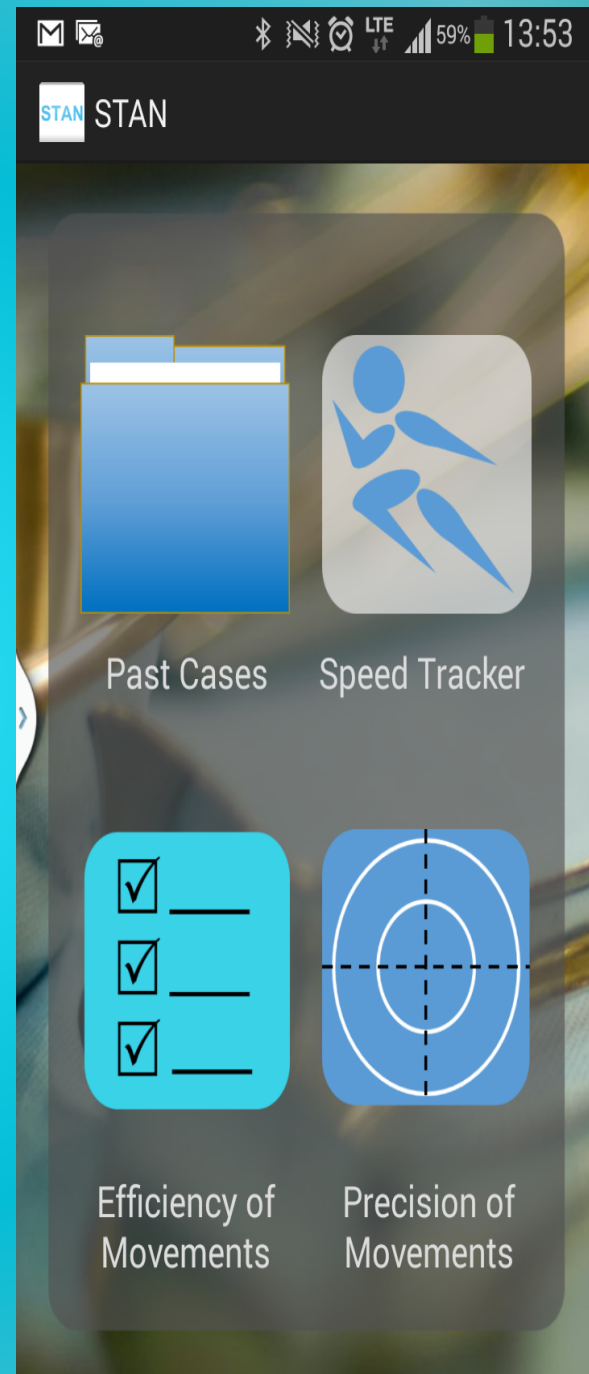
Is motion analysis a valid tool for assessing laparoscopic skill?

John D. Mason · James Ansell · Neil Warren · Jared Torkington

STAN

Tracks surgeons' hand movements

To Improve technical performance



How does it improve performance?

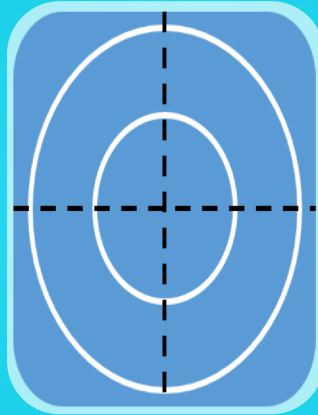
Bluetooth sensors attached to surgeon's wrists
Track 3-axis accelerometer data to give feedback on speed, precision, and efficiency of movement



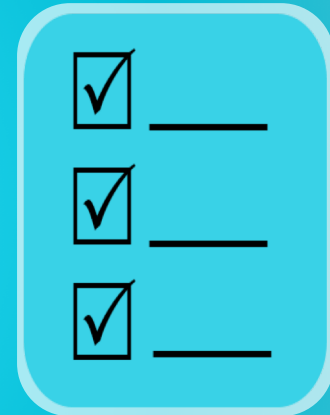
How does it give feedback?



Speed
derived
from time

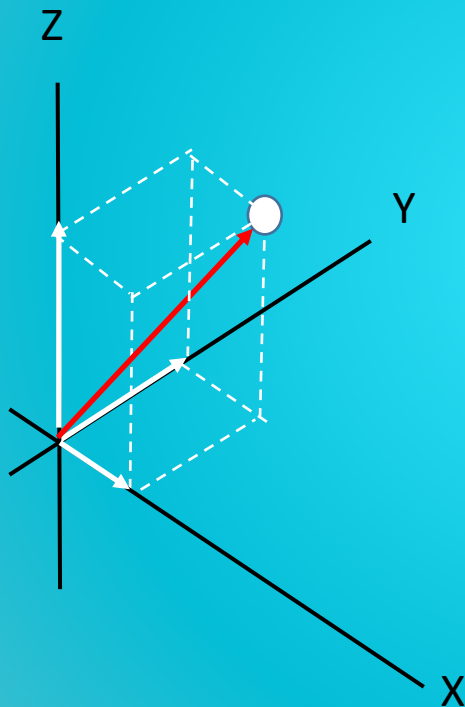


Precision
derived from
changes in
acceleration



Efficiency
derived
from
number of
movements

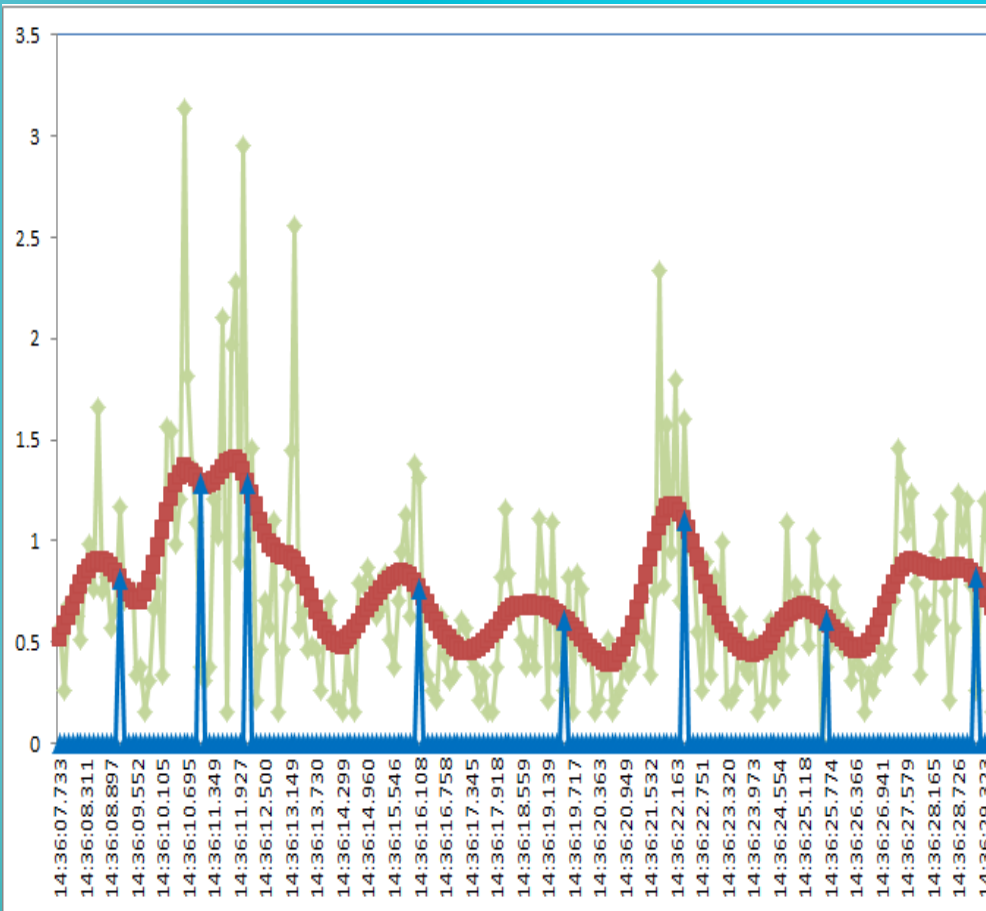
Precision



“Precision”

- controlled movements
- changes in acceleration

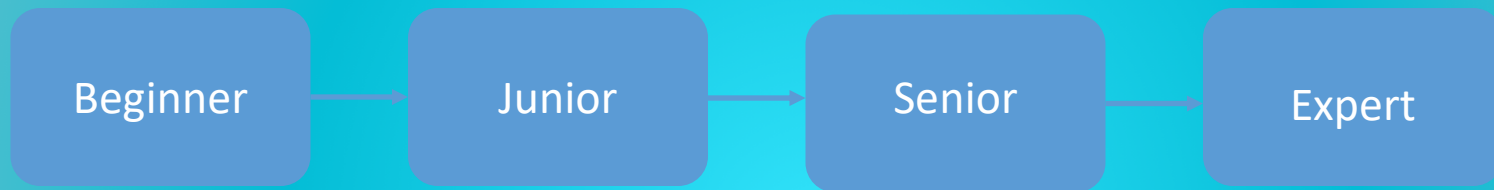
Efficiency



“Movement”

- Cluster of accelerations

Performance Categories



Category-Specific Tips

Junior level speed - “Try picking up the next peg with your free hand while putting down the previous one”

ECE 1778

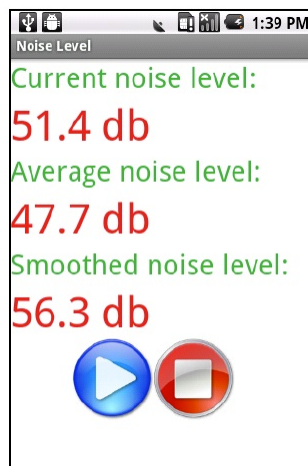
WhimPer – A Noise Mapping App

Yeliny Bonilla

Ali Sabti

Sajad Shirali-Shareza

April 2011

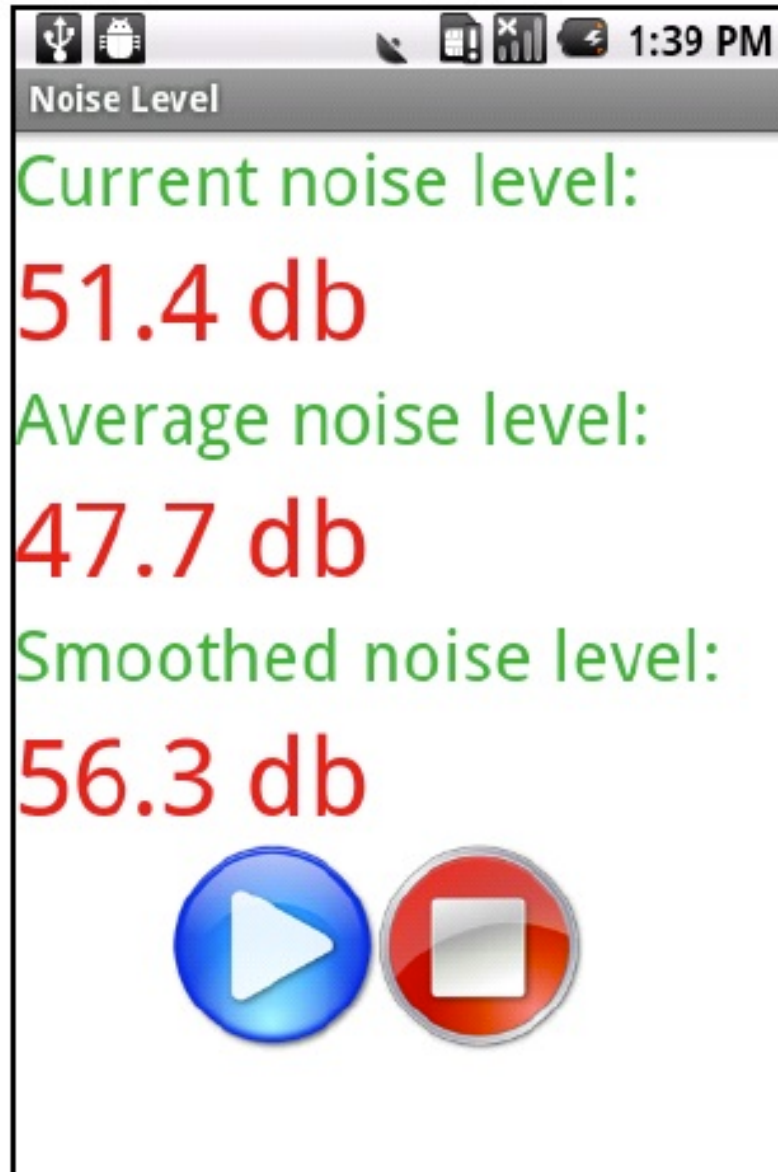


Whimper – Noise Mapping

- The issue: the world is full of noise, and noise pollution can reduce hearing
- The goal: create an app that can measure the noise at each location the phone ‘walks’ through
- Use this to create a Noise Map
 - Assuming more than one person uses it – crowd sourcing – a map of a city can be easily created.



Live Measurement Screen



The screenshot shows a mobile application interface for noise level measurement. At the top, there is a status bar with various icons and the time 1:39 PM. Below the status bar is a header labeled "Noise Level". The main display area shows three noise level measurements in green text, each followed by a large red numerical value in dB:

- Current noise level: 51.4 db
- Average noise level: 47.7 db
- Smoothed noise level: 56.3 db

At the bottom of the screen, there are two circular buttons: a blue play button and a red stop button.

Daily Noise Measurement v. Time

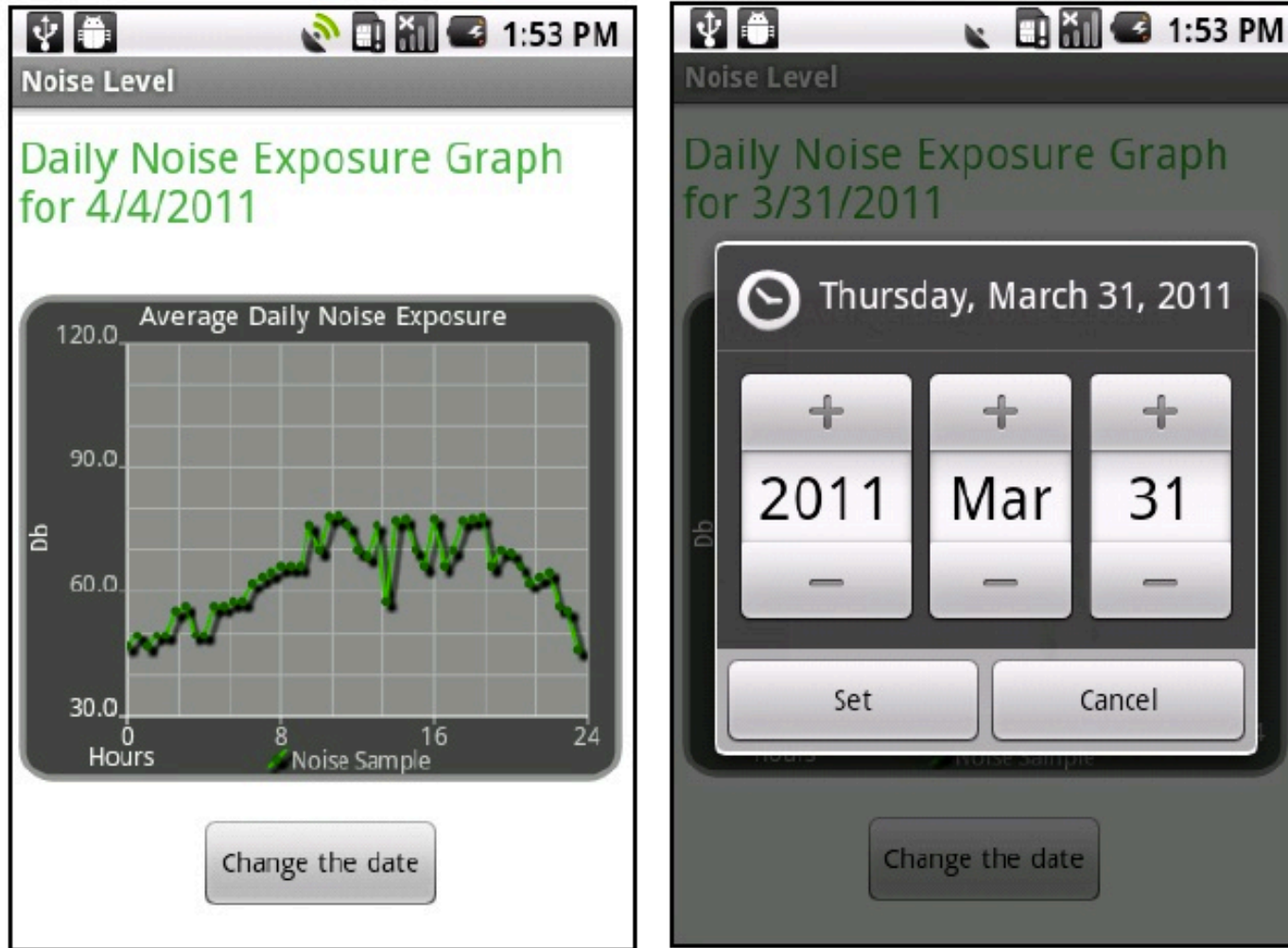


Figure 4. Noise exposure feature of the WhIMPeR application. The figure on the right shows the ability to change the date for which the data is displayed

Noise Map

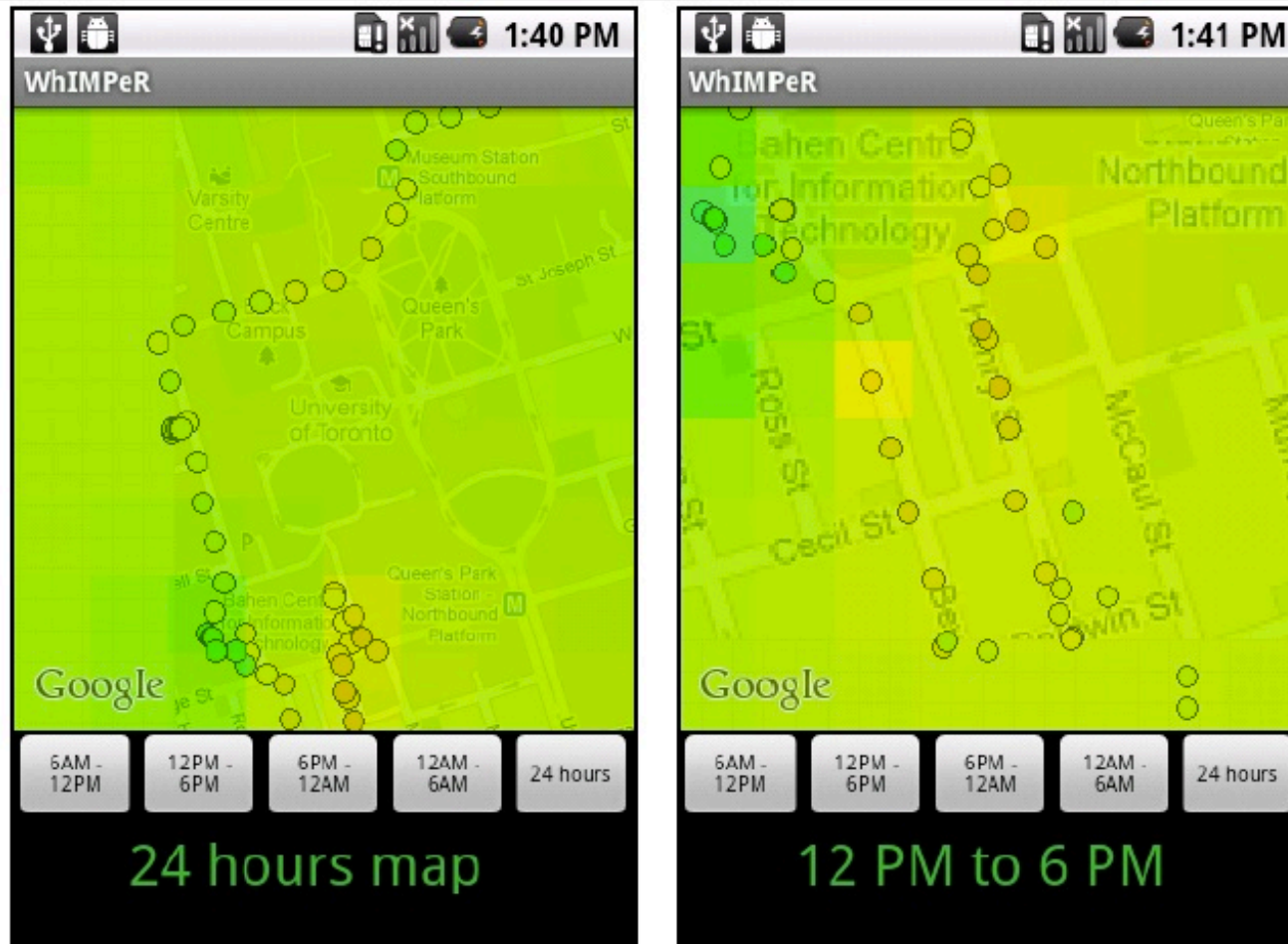


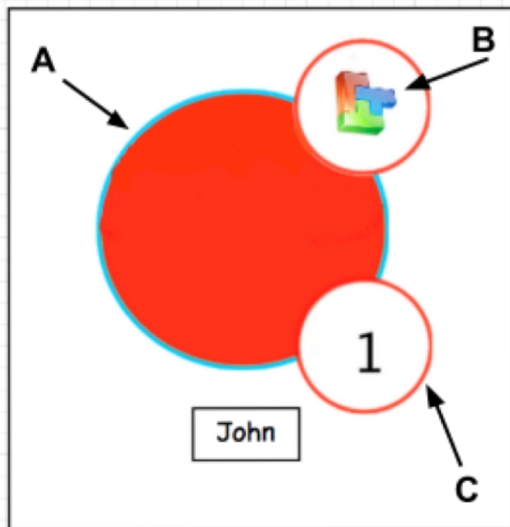
Figure 5. Noise map showing selected points of the noise data as well as a noise intensity overlay. The figure on the right shows the feature of time interval selection.

Noise Colour Code for Map

VERY LOUD	
Dangerous over 30 minutes	110 <ul style="list-style-type: none">• Concerts (any genre of music)• Car horns• Sporting events
	100 <ul style="list-style-type: none">• Snowmobiles• MP3 players (at full volume)
	90 <ul style="list-style-type: none">• Lawnmowers• Power tools• Blenders• Hair dryers
Over 85 dB for extended periods can cause permanent hearing loss.	
LOUD	
	80 <ul style="list-style-type: none">• Alarm clocks
	70 <ul style="list-style-type: none">• Traffic• Vacuums
MODERATE	
	60 <ul style="list-style-type: none">• Normal conversation• Dishwashers
	50 <ul style="list-style-type: none">• Moderate rainfall
SOFT	
	40 <ul style="list-style-type: none">• Quiet library
	30 <ul style="list-style-type: none">• Whisper

ECE 1778

Baton – Helping Teacher-Student Communication



Zak Teitel

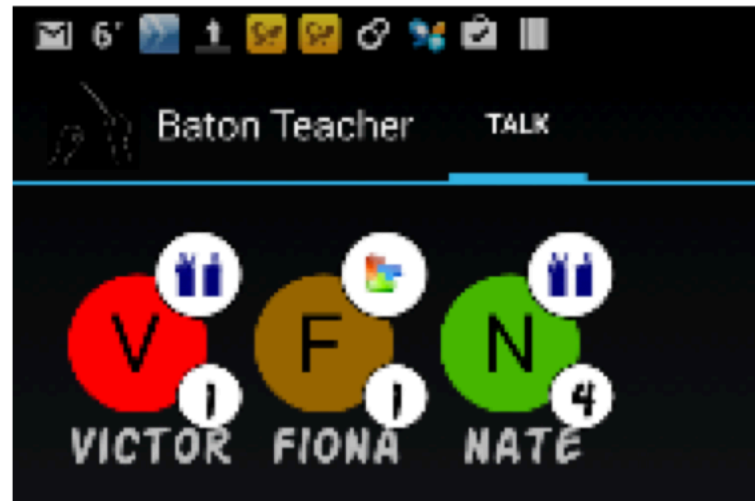
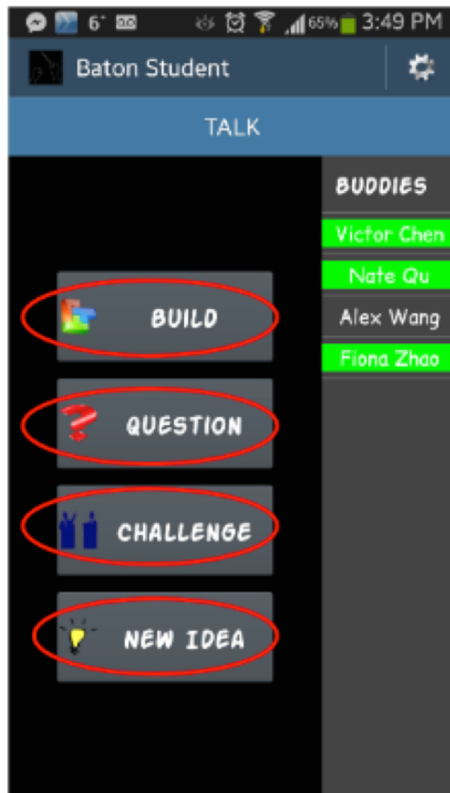
Victor Li Chen

Fiona Yi Zhao

April 2014

Putting Up Your Hand In Class

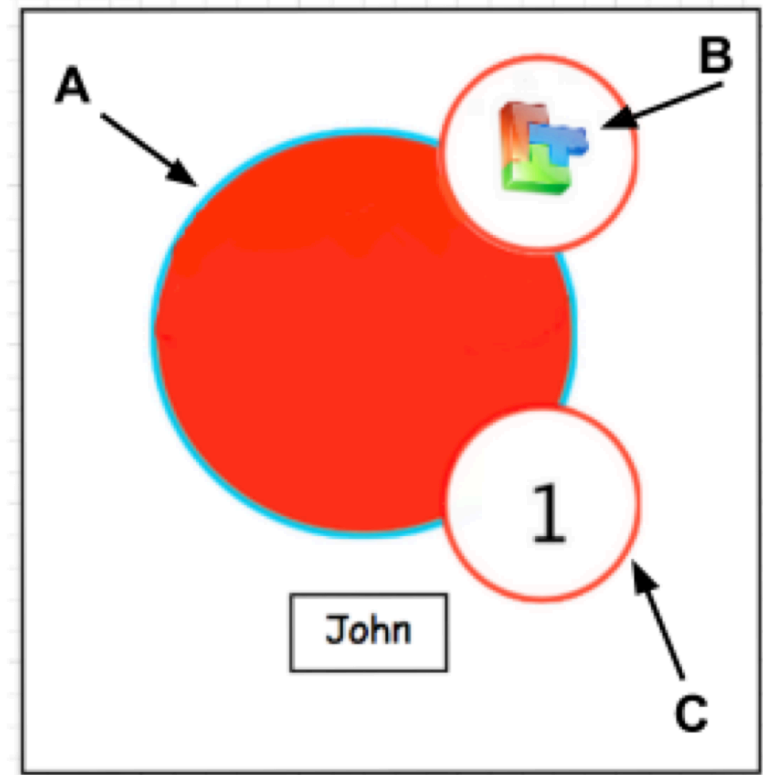
- Doesn't give the teacher much information about what you want to contribute to a fluid discussion
- What if the teacher could know more about your intent?



(83)

Information for Teacher

- A. Main bubble offers a visualization of student wait-time. Student icons start green and the longer a student waits to participate, the redder their icon gets. You can see in image 3.1 that John has been waiting for quite some time. In user consultations, teachers indicated they wanted ambient awareness of wait-time via colour as giving them exact time measurements via a clock or stopwatch would have been “too much” to handle.
- B. The upper bubble offers a visualization of “participation intent”.
- C. The lower bubble lets teachers know how many times a particular student has participated in class.



3.1 Student Icon Breakdown

Baton Presentation

- See BatonEdit.m4v in this directory.



This Was a Great Project

- Well described, novel
- Sufficiently Technical
- And a very interesting App

But....

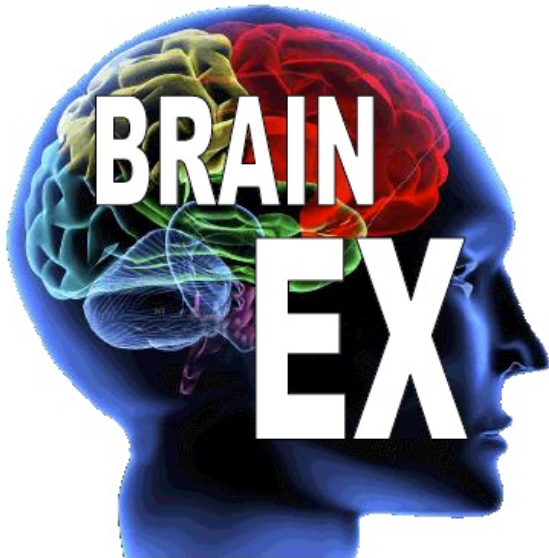
- it didn't start out that way
- Zak, at the beginning, had no idea what was possible, and began with far more complex ideas
- The ideas didn't make a lot of sense at the beginning
- Through dialogue with programmers and us (myself, TAs) converged to something that worked very well

Key: creativity is messy; requires communication, evolution, iteration; kindness, reflection, then action



ECE 1778

BrainEx – Exercise for your Brain



Jinyoung Kim
Rowa Karkokli+

April 2011

Dementia & Brain Exercise

- Dementia is a cognitive disorder resulting in loss of memory, changes in personality, and loss of social ability.
- Prevention is the key since most types of dementia are permanent and cannot be cured.
- Research suggests brain exercise and activities that stimulate the brain may delay memory declines and can also reduce one's risk of getting dementia and related symptoms.
- The BrainEx application is designed for this specific purpose.

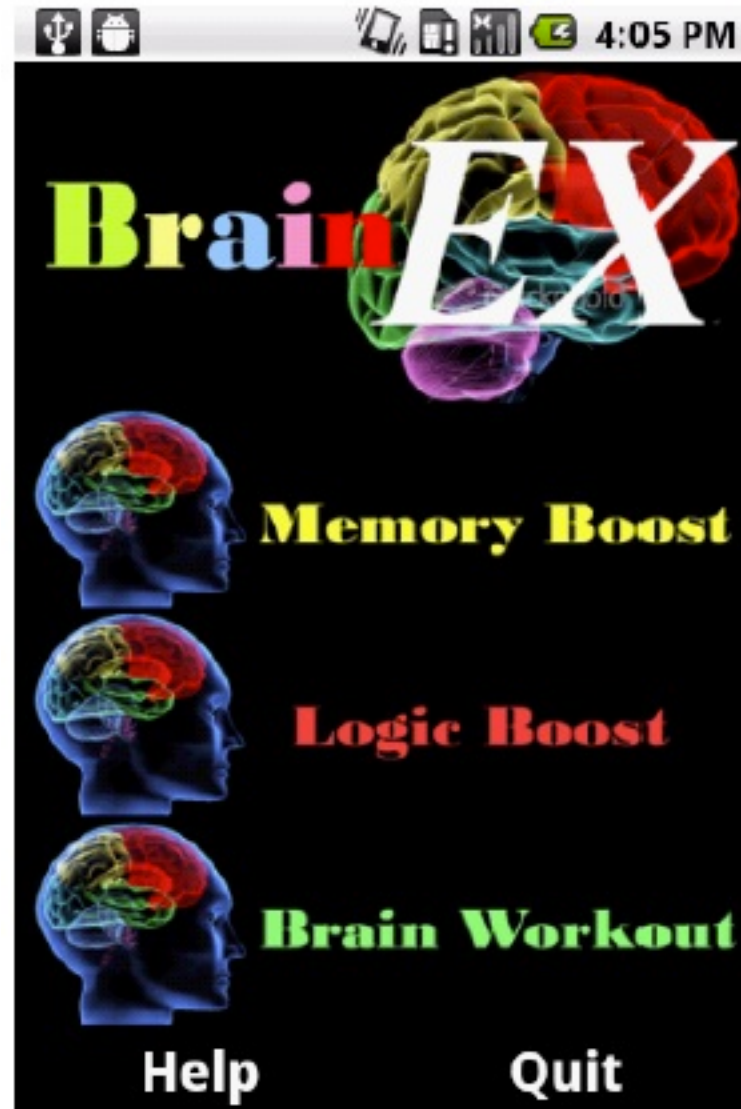


The Games

- Three games that stimulate the brain in different ways
 - allowing the user to choose a game of their interest.
 - 1. Game 1: designed to stimulate the user's memory,
 - 2. Game 2: target the user's problem solving skills,
 - 3. Game 3: targeting both memory and problem solving skills.
-
- Each game assesses the user's performance and speed and advances the game to increase the stimulation of the brain.



Starting Screen – Choose Game



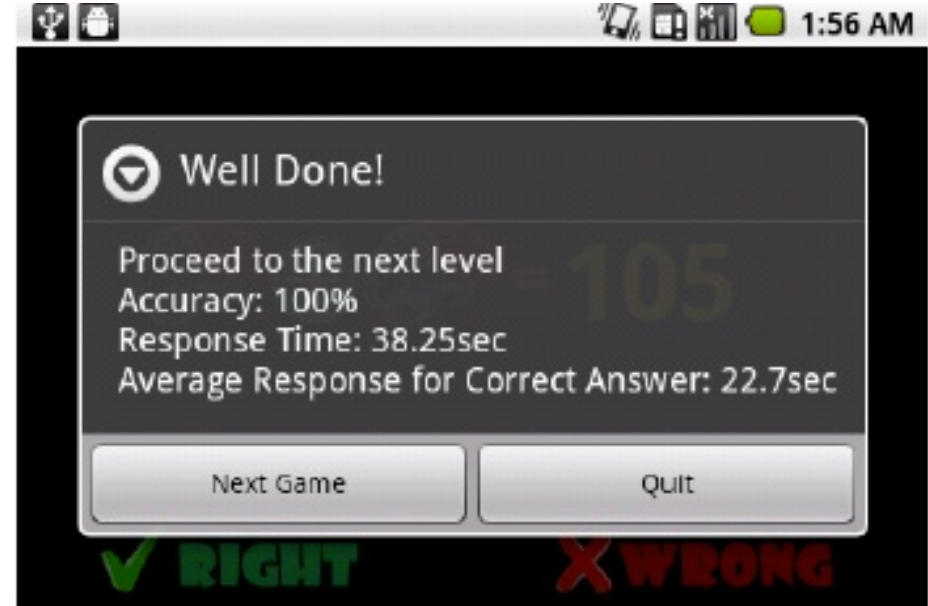
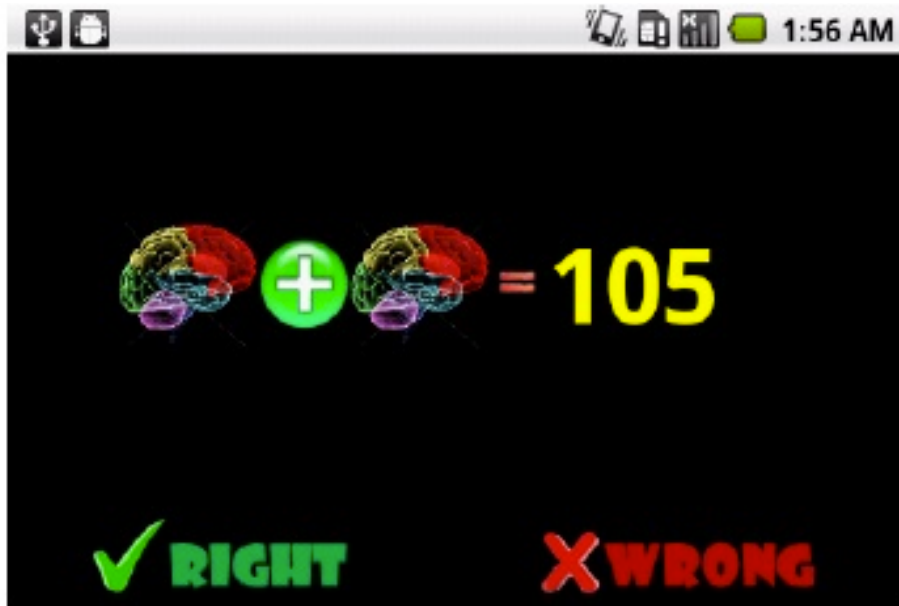
(90)



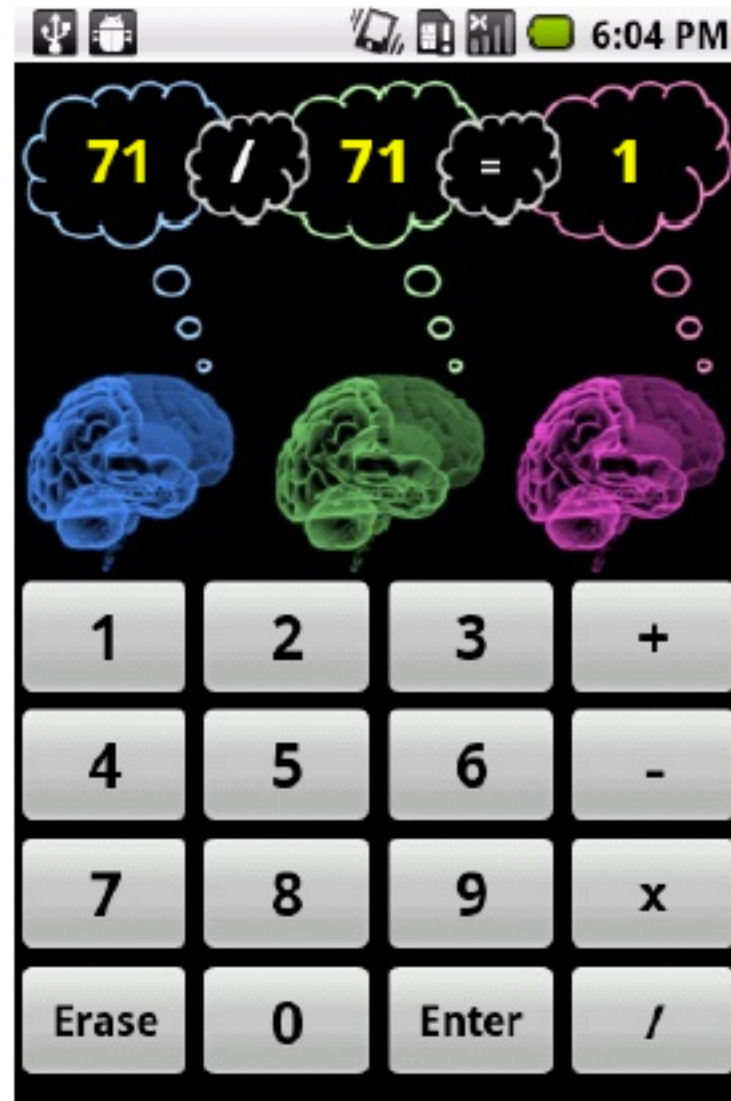
How To Play



The Result



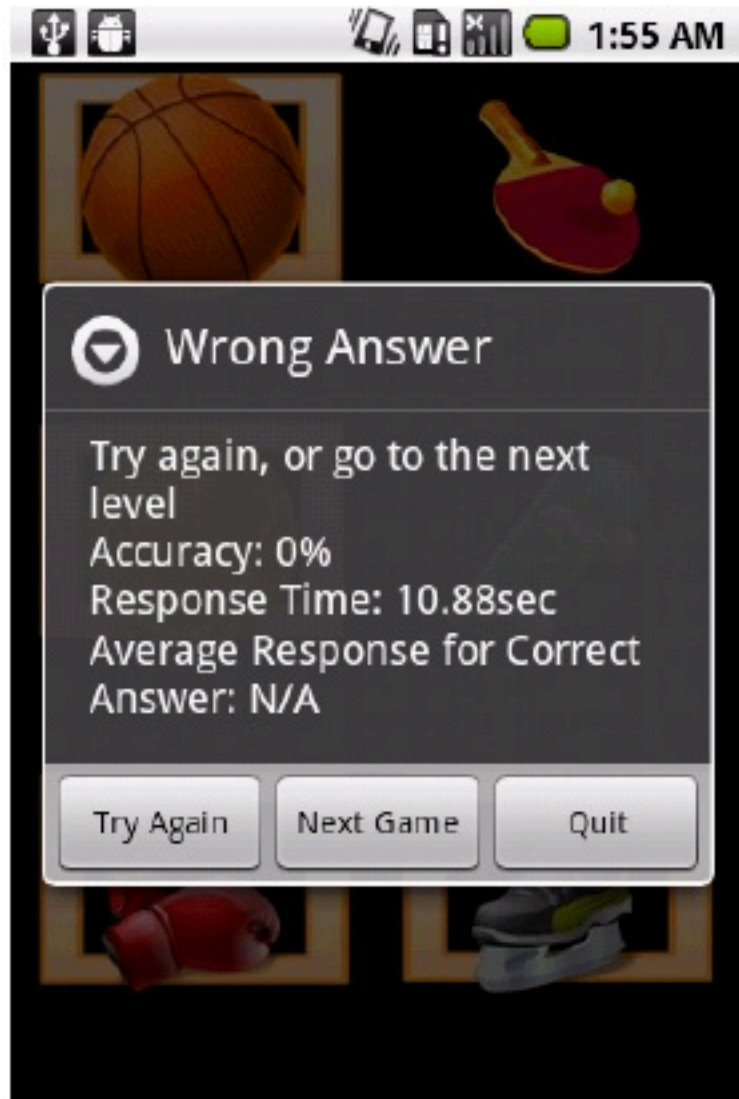
Number Calculation



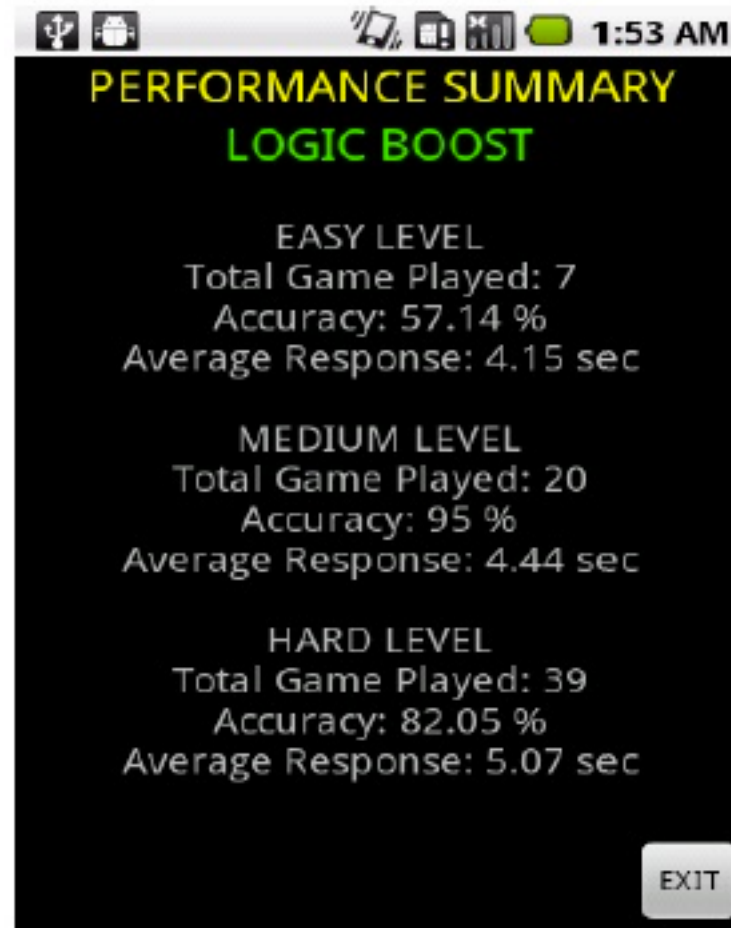
Sport/Pictures



(94)



Summary of Results



APPnea: Sleep Apnea Detection



Phil Lam
Regina Leung
Thuva Sivayogan

April 2012

What is Sleep Apnea

- Sleep apnea is a common (and under-diagnosed) sleep disorder
 - characterized by periods of interrupted or shallow breathing during sleep
- Affects the quality of life of individuals
 - extreme fatigue and poor concentration
 - may also lead to other serious medical conditions
 - cardio/cerebrovascular problems with mortality rates as high as 35%.



Sleep Apnea, continued

- Key issues in Apnea detection and treatment:
 1. Limited availability & high cost of clinical sleep Apnea detection method:
 - patient must spend a night under observation by technician and clinician in a “sleep lab.”
 2. lab test is performed in foreign environments with multiple electrodes attached to the individual
 - may induce stress & cause inaccurate results.
 3. CPAP (Continuously Positive Airway Pressure) is a commonly prescribed treatment for sleep apnea, but offers low rates of patient compliance. This is primarily due to the fact that the required mask over the nose and mouth is uncomfortable.



The App

- APPnea operates by detecting the rate of respiration with the phone's accelerometer.
- This is accomplished by using a pouch to attach the phone to the user's chest.
- Signal processing algorithms involving a combination of time domain and frequency domain techniques are used for the detection of apnea events.
- The number of sleep apnea events per night are recorded, saved in a log, and displayed back to the user in the form of a histogram for daily sleep apnea monitoring.

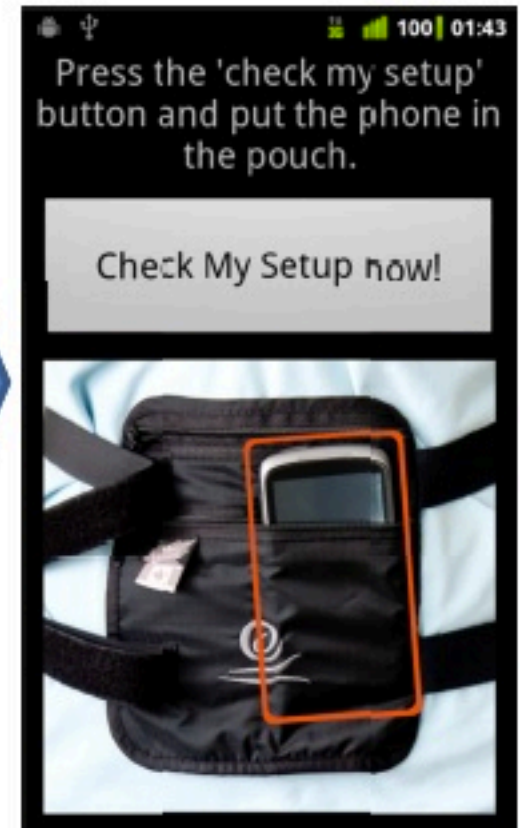


Detecting an Apnea Event

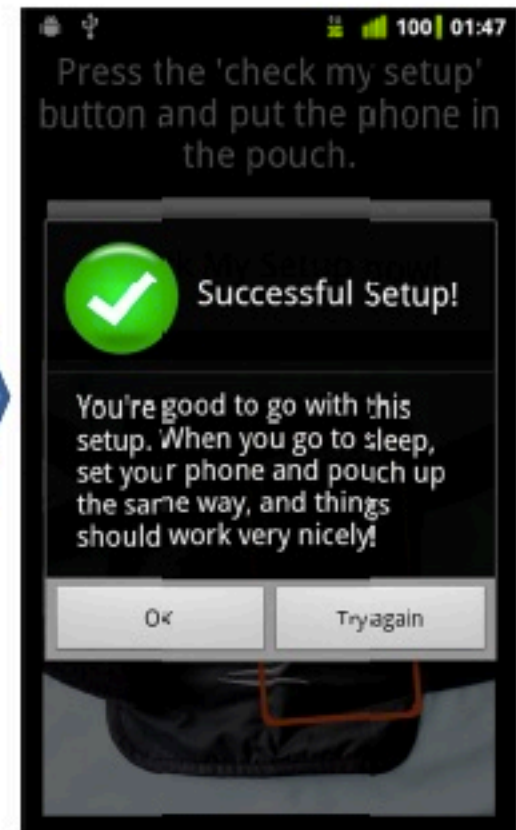
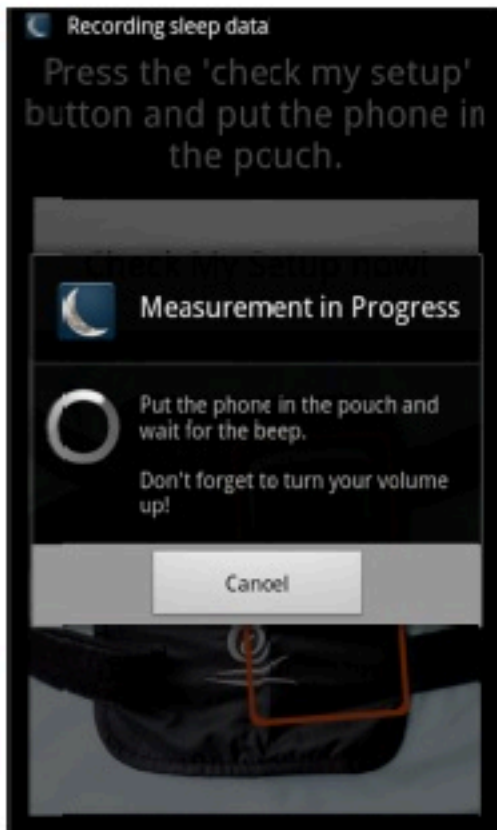
- Apnea: person stops breathing while sleeping
 - Assume this means the chest stops moving
- Strap phone to chest, and use accelerometer to calculate pitch and roll with respect to gravity
- Search for periods of no movement, ranging from 10 seconds to 2 minutes
 - Followed by 2 minutes of breathing



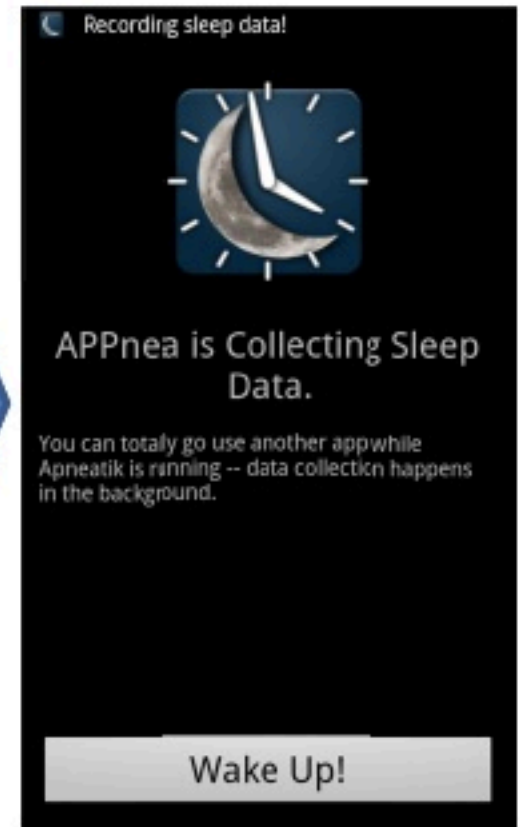
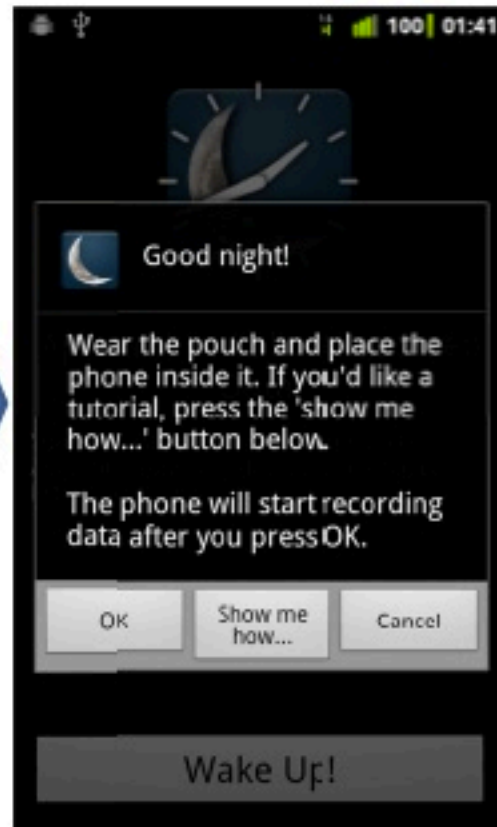
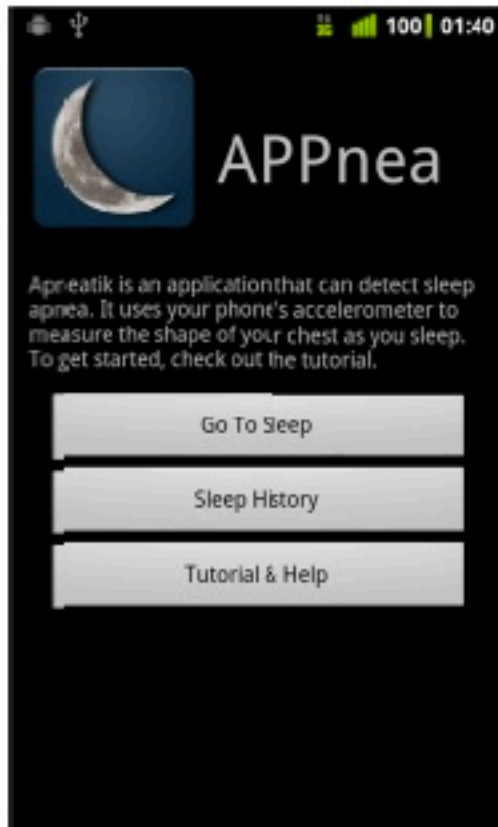
User Tutorial



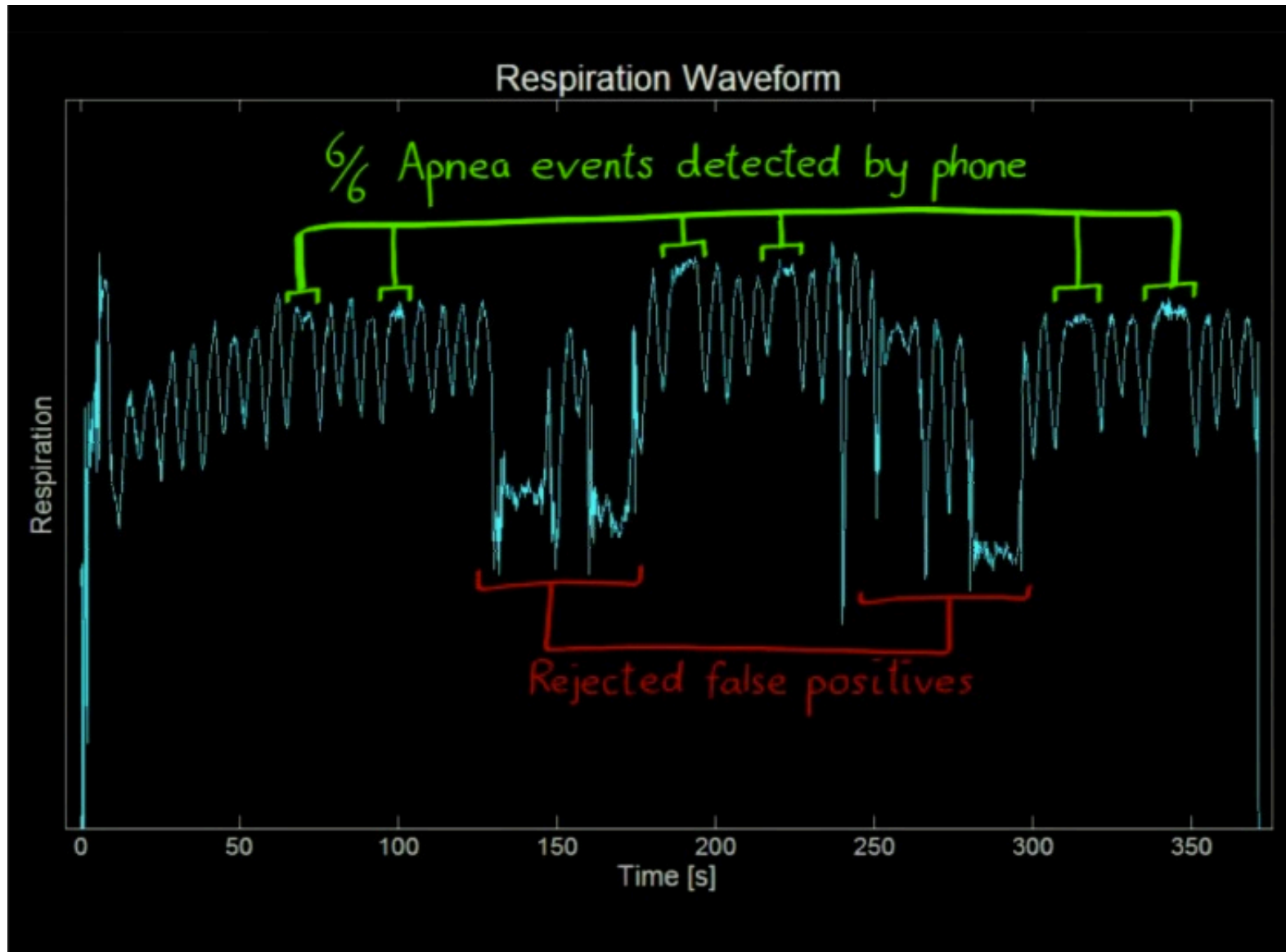
User Tutorial, cont'd



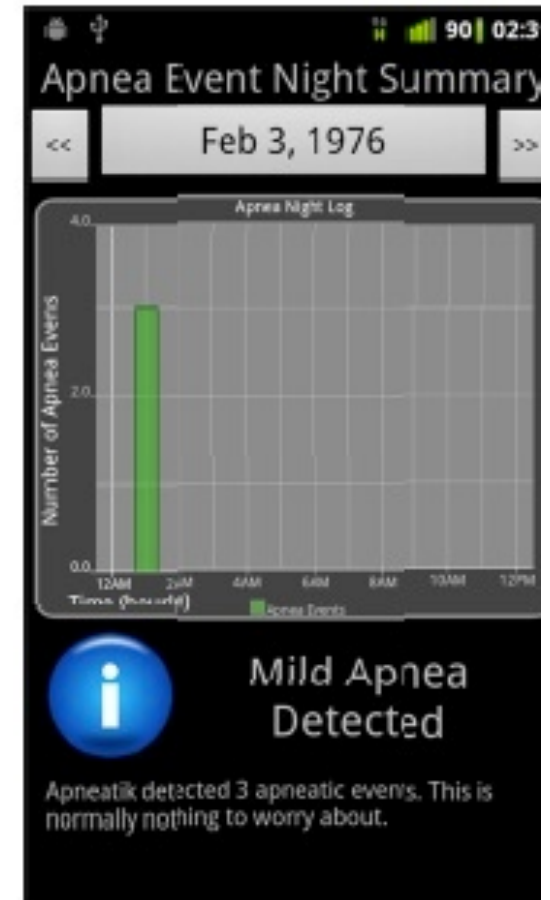
App Controls



Example Collected Data



Output From App



Surgical Black Box

Reviewing Surgery & Detecting Errors

Ted Avery
Jill Cates
Eddie He



April 2012

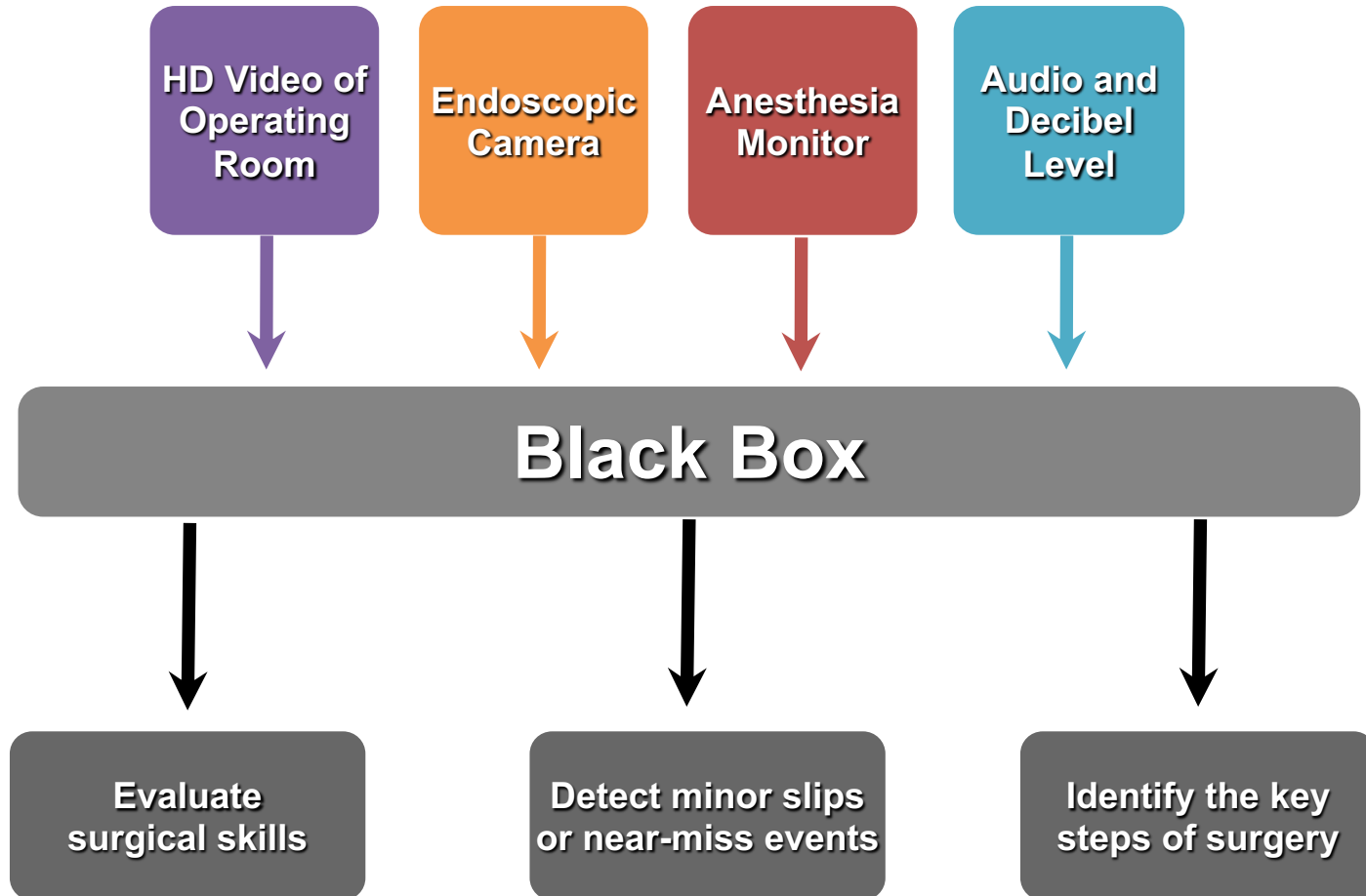
Surgical Errors

- In 2004, it was estimated that 9,000 to 24,000 Canadians die each year as a result of preventable medical errors
- Studies have shown that at least half of all surgical complications are avoidable

Baker GR et al. *CMAJ* 2004;170:1678-85 ; Haynes et al. *NEJM* 2009;360:491-9.



System



Interim Goal

HD Video of
Operating
Room

Endoscopic
Camera

Anesthesia
Monitor

Audio and
Decibel
Level

Black Box

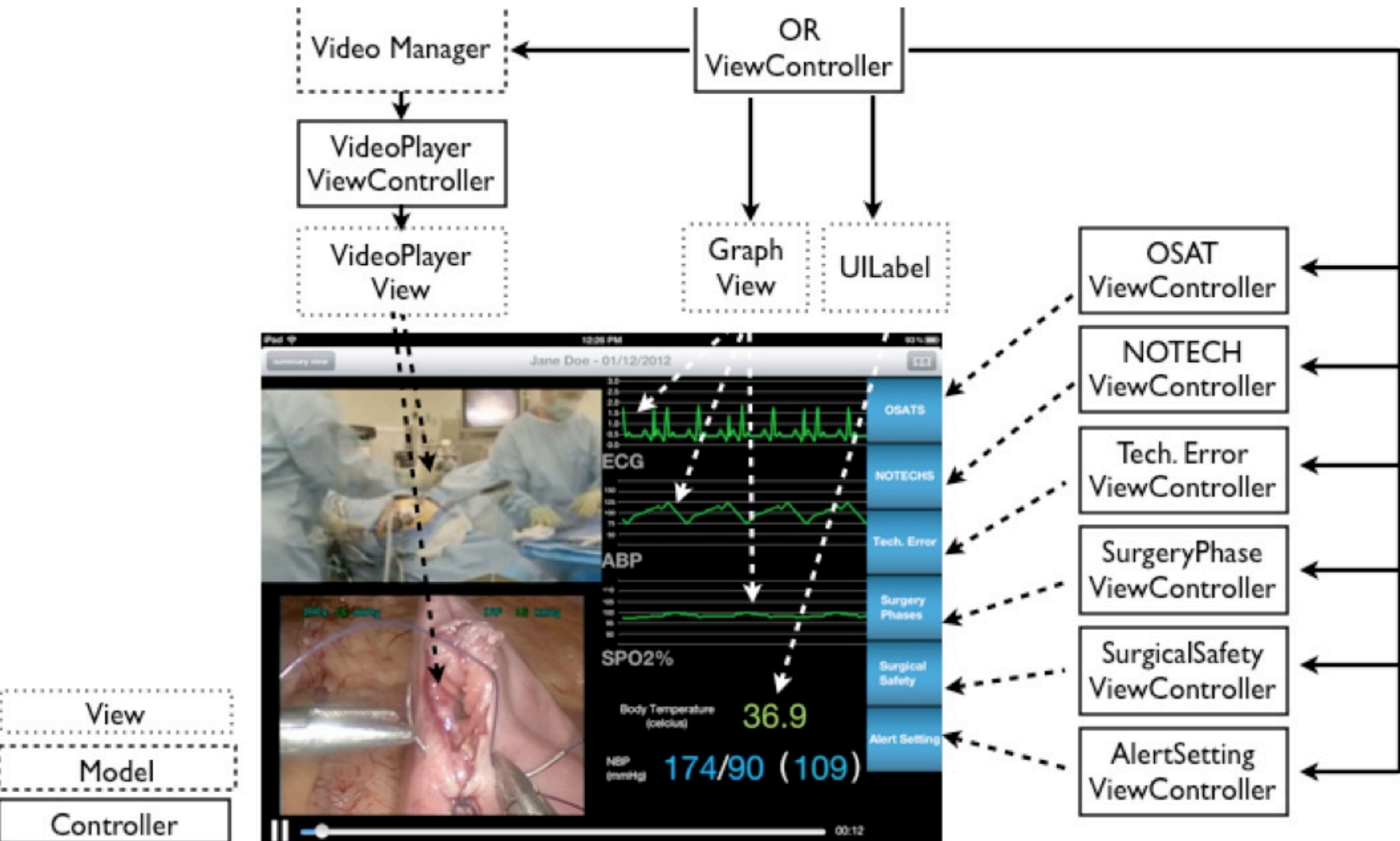
Live Mode
real-time streaming
to a remote location



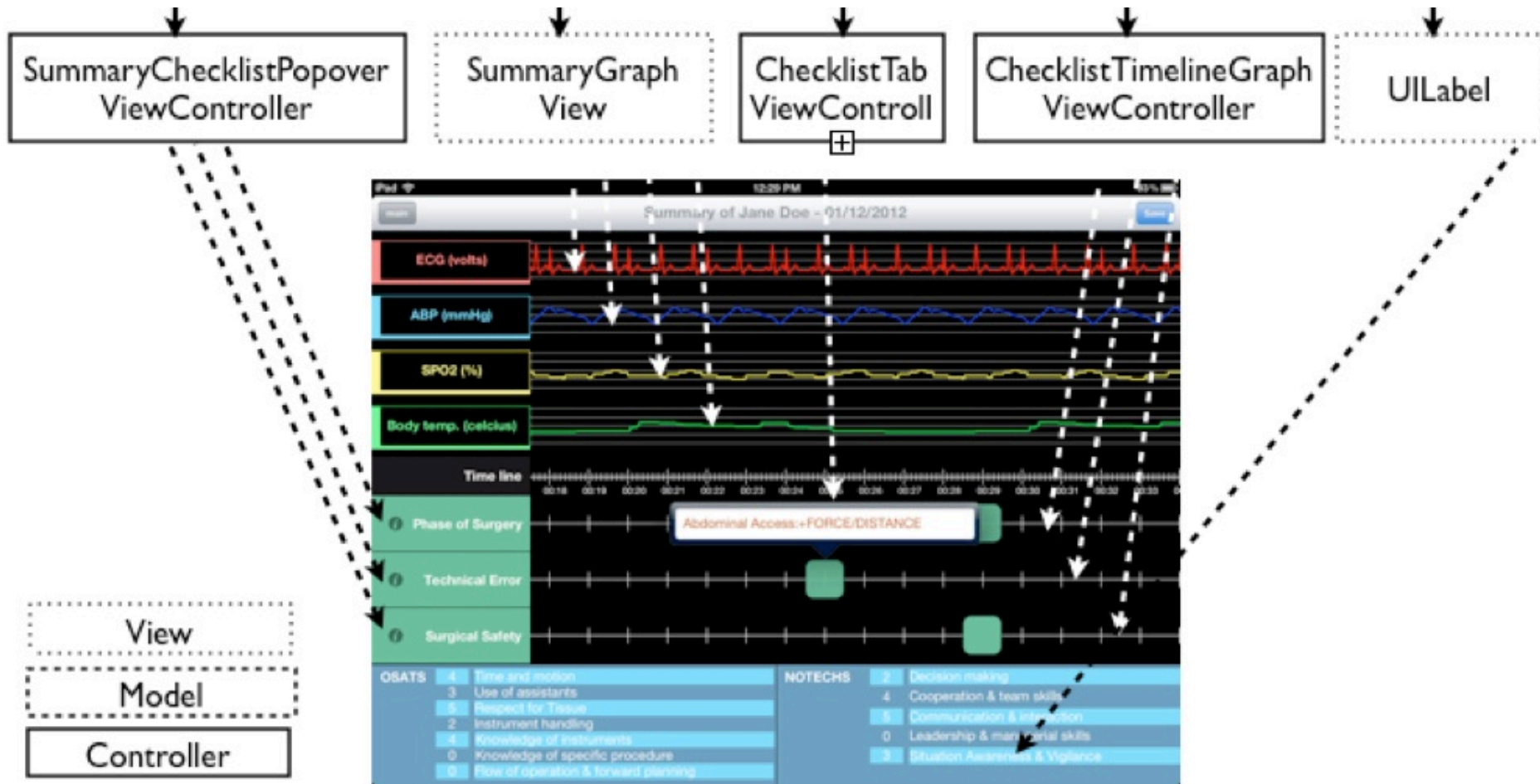
for ECE1778

**Review Mode
post-operative
analysis of a surgical
procedure**

Endoscopic Video and Data Views



Data Time Line



Annotation



*Toolbar contains
checklists and global
rating scales
(NOTECHS, OSATS)*

Annotation – found mistakes!



Checklist Notation

Global Rating Scale



Alerts



Alert: Arterial blood pressure (ABP) values have exceeded the threshold levels.

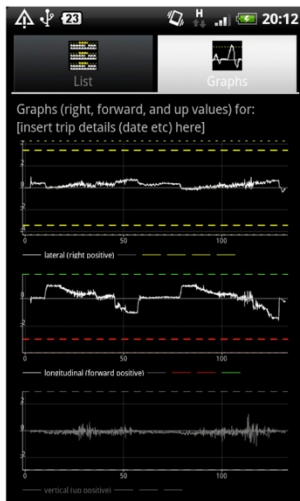
Testing with Surgeons

- Tested the app with 2 surgeons at St. Michael's Hospital
- 10-minute segment of a laparoscopic gastric bypass procedure
- Each surgeon produced similar annotations



DriveMod

Driver Behaviour Modification and Data Collection



Frances Awachie
Adrian Matheson
Matthew Thorpe

April 2012

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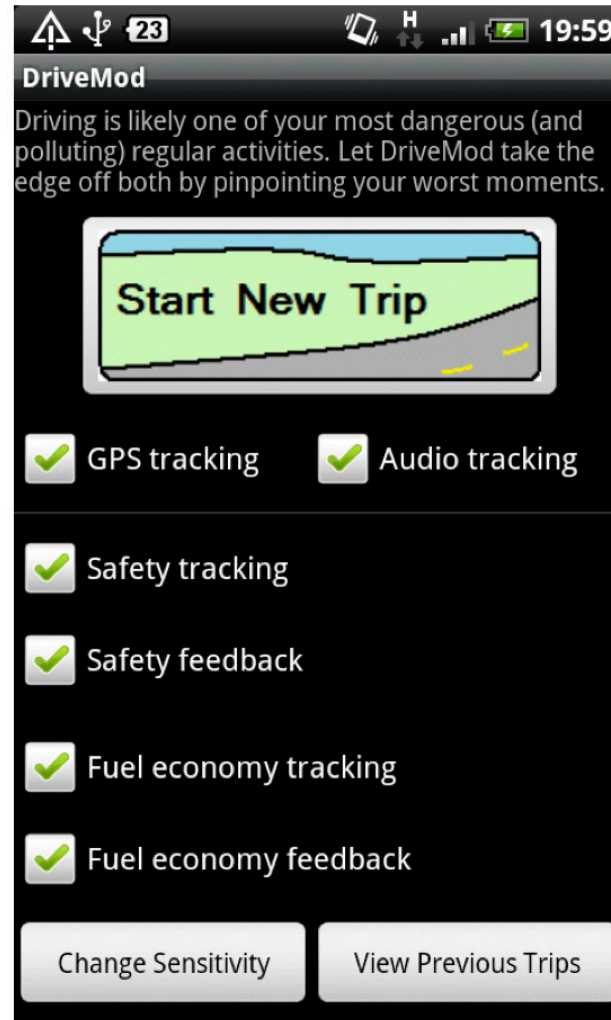
Bad Driving Kills People

- 1.2 million people per year killed globally (UN, 2004)
 - every tenth bed in hospitals is occupied by a victim of a motor vehicle collisions (UN, 2004)
- 2,500 in Canada
- 34,000 in USA



DriveMod Detects Bad Driving Events

- Steering
 - Abrupt
 - Hard
- Braking
 - Abrupt
 - Hard
- Throttle
 - Hard



Set Thresholds to Detect Events

23 20:01

Lateral Longitudinal **Other**

Rough Road Rejection (vertical acceleration)

300 mg

500 ms

Minimum Time Between Events

2000 ms

Minimum Time Between Samples

50 ms

Revert to default settings

23 20:00

Lateral Longitudinal **Other**

Abrupt Turning

440 mg

200 ms

Hard Turning

350 mg

1500 ms

Revert to default settings

23 20:01

Lateral Longitudinal **Other**

Abrupt Braking

400 mg

200 ms

Hard Braking

300 mg

1000 ms

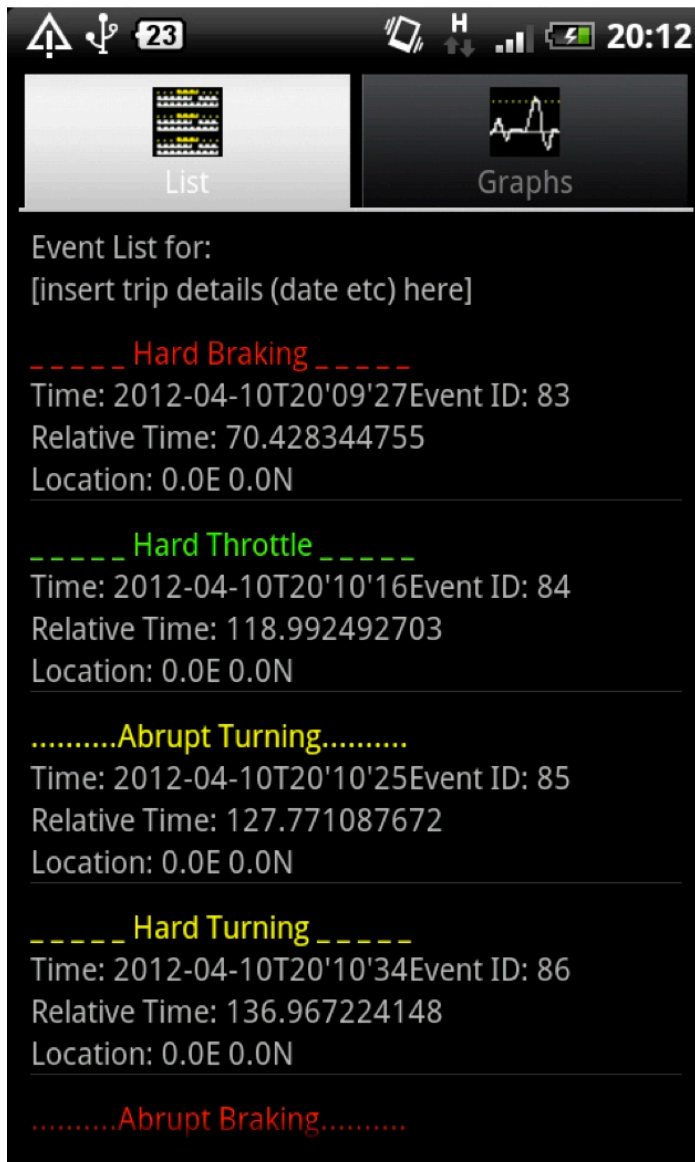
Hard Throttle

180 mg

1500 ms

Revert to default settings

After Driving – See What Happened!



Event List for:
[insert trip details (date etc) here]

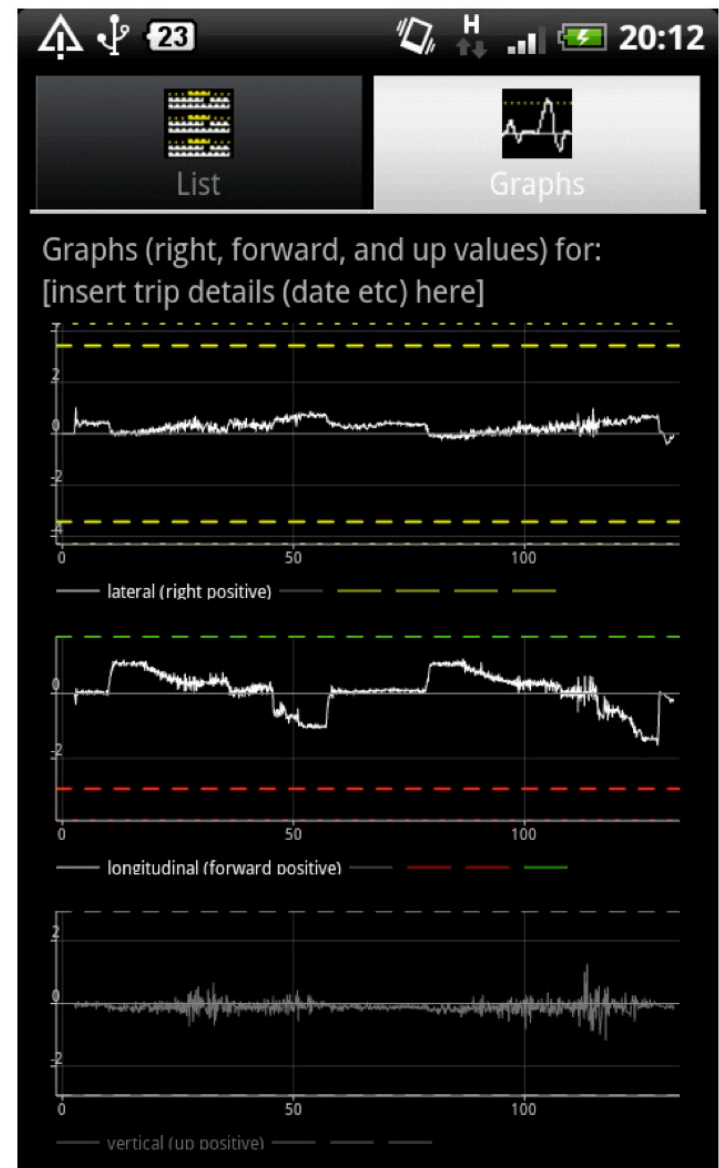
----- **Hard Braking** -----
Time: 2012-04-10T20'09'27Event ID: 83
Relative Time: 70.428344755
Location: 0.0E 0.0N

----- **Hard Throttle** -----
Time: 2012-04-10T20'10'16Event ID: 84
Relative Time: 118.992492703
Location: 0.0E 0.0N

.....**Abrupt Turning**.....
Time: 2012-04-10T20'10'25Event ID: 85
Relative Time: 127.771087672
Location: 0.0E 0.0N

----- **Hard Turning** -----
Time: 2012-04-10T20'10'34Event ID: 86
Relative Time: 136.967224148
Location: 0.0E 0.0N

.....**Abrupt Braking**.....



Graphs (right, forward, and up values) for:
[insert trip details (date etc) here]

lateral (right positive)

longitudinal (forward positive)

vertical (up positive)